NEC

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NEC Express5800/120Rh-1
User's Guide

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Keep this User's Guide at hand for quick reference at anytime necessary.

SAFETY INDICATIONS

Follow the instructions in this User's Guide for your safety to use the server.

The server contains components with possible danger, hazards that may cause by ignoring warnings, and preventive actions against such hazards.

Server components with possible danger are indicated with a warning label placed on or around them as well as described in this User's Guide.

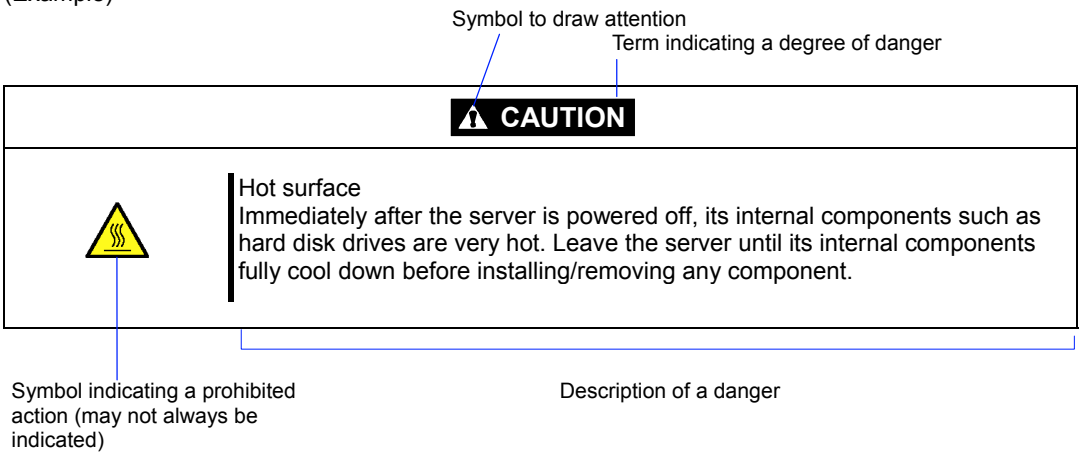
In the User's Guide or warning labels, "WARNING" or "CAUTION" is used to indicate a degree of danger. These terms are defined as follows:

⚠ WARNING	Indicates the presence of a hazard that may result in death or serious personal injury if the instruction is ignored.
⚠ CAUTION	Indicates the presence of a hazard that may cause minor personal injury, including burns, or property damage if the instruction is ignored.

Precautions and notices against hazards are presented with one of the following three symbols. The individual symbols are defined as follows:

	This symbol indicates the presence of a hazard if the instruction is ignored. An image in the symbol illustrates the hazard type. (Attention)
	This symbol indicates prohibited actions. An image in the symbol illustrates a particular prohibited action. (Prohibited Action)
	This symbol indicates mandatory actions. An image in the symbol illustrates a mandatory action to avoid a particular hazard. (Mandatory Action)

(Example)


Symbol to draw attention
Term indicating a degree of danger
⚠ CAUTION
Hot surface
Immediately after the server is powered off, its internal components such as hard disk drives are very hot. Leave the server until its internal components fully cool down before installing/removing any component.
Symbol indicating a prohibited action (may not always be indicated)
Description of a danger

SYMBOLS USED IN THIS USER'S GUIDE AND WARNING LABELS

Attentions

	Indicates that improper use may cause an electric shock.
	Indicates that improper use may cause personal injury.
	Indicates that improper use may cause explosion or burst.
	Indicates that improper use may cause fingers to be caught.
	Indicates that improper use may cause personal injury.
	Indicates that improper use may cause fumes or fire.
	Indicates a general notice or warning that cannot be specifically identified.

Prohibited Actions

	Do not disassemble, repair, or modify the server. Otherwise, an electric shock or fire may be caused.
	Keep water or liquid away from the server. Otherwise, an electric shock or a fire may be caused.
	Do not touch the server components with wet hand. Otherwise, an electric shock may be caused.
	Do not place the server near a fire. Otherwise, a fire may be caused.
	Do not touch any other component than specified. Otherwise, an electric shock or burn may be caused.
	Indicates a general prohibited action that cannot be specifically identified.

Mandatory Action

	Unplug the power cord of the server. Otherwise, an electric shock or fire may be caused.
	Be sure to provide earthing. Otherwise, an electric shock or fire may be caused.
	Indicates a mandatory action that cannot be specifically identified. Make sure to follow the instruction.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CE Statement

Warning: This is a Class A product. In domestic environment this product may cause radio interference in which case the user may be required to take adequate measures (EN55022).

BSMI Statement

警告使用者：

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

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Windows Vista stands for Microsoft® Windows Vista® Business operating system. Windows Server 2003 x64 Editions stands for Microsoft® Windows® Server 2003 R2, Standard x64 Edition Operating system and Microsoft® Windows® Server 2003 R2, Enterprise x64 Edition operating system, or Microsoft® Windows® Server 2003, Standard x64 Edition operating system and Microsoft® Windows® Server 2003, Enterprise x64 Edition operating system. Windows Server 2003 stands for Microsoft® Windows® Server 2003 R2, Standard Edition operating system and Microsoft® Windows® Server 2003 R2, Enterprise Edition operating system, or Microsoft® Windows® Server 2003, Standard Edition operating system and Microsoft® Windows® Server 2003, Enterprise Edition operating system. Windows XP x64 Edition stands for Microsoft® Windows® XP Professional x64 Edition operating system. Windows XP stands for Microsoft® Windows® XP Home Edition operating system and Microsoft® Windows® XP Professional operating system. Windows 2000 stands for Microsoft® Windows® 2000 Server operating system and Microsoft® Windows® 2000 Advanced Server operating system, and Microsoft® Windows® 2000 Professional operating system. Windows NT stands for Microsoft® Windows NT® Server network operating system version 3.51/4.0 and Microsoft® Windows NT® Workstation operating system version 3.51/4.0. Windows Me stands for Microsoft® Windows® Millennium Edition operating system. Windows 98 stands for Microsoft® Windows®98 operating system. Windows 95 stands for Microsoft® Windows®95 operating system. WinPE stands for Microsoft® Windows® Preinstallation Environment.

Momentary voltage drop prevention:

This product may be affected by a momentary voltage drop caused by lightning. To prevent a momentary voltage drop, an AC uninterruptible power supply (UPS) unit should be used.

PREFACE

Welcome to the NEC Express5800/120Rh-1 server.

The NEC Express5800 server holds powerful performance and employs the latest technology to implement a computer for the next generation. With its potential capabilities, the server may be used as the workstation PC that configures a client-server system and provides high-speed processing and superior reliability.

Read this User's Guide thoroughly to fully understand handling of the server and appreciate its functions to the maximum extent.

ABOUT THIS USER'S GUIDE

This User's Guide is a guide for proper setup and use of the server.
This User's Guide also covers useful procedures for dealing with difficulties and problems that may arise during setup or operation of the server.
Keep this manual for future use.
The following describes how to proceed with this User's Guide.

How to Use This User's Guide

To aid you in finding information quickly, this User's Guide contains the following information:

Chapter 1 Notes on Using Your Server
includes information that needs attention to use the server. Make sure to read this chapter before setting up and using the server. It also includes requirements and advisory information for transfer and disposal of the server.

Chapter 2 General Description
includes information necessary to use the server, such as names and functions of its components, handling of the optical disk drive.

Chapter 3 Setting Up Your Server
tells you how to select a site, unpack the system, assemble the rack-mount subsystem, make cable connections, and power on your system.

Chapter 4 Configuring Your Server
tells you how to configure the system and provides instructions for running the BIOS SETUP Utility and the RAID Configuration utility, which is used to configure RAID System in your system. This chapter also provides information on mother board jumper settings.

Chapter 5 Installing the Operating System with Express Setup
describes how to install the operating system.

Chapter 6 Installing and Using Utilities
describes how to install the utilities for the server. It also includes a description on using the attached "NEC EXPRESSBUILDER" DVD.

Chapter 7 Maintenance
provides you with all the information necessary to maintain successful operation of the server. This chapter also includes a description on relocating and storing the server.

Chapter 8 Troubleshooting
contains helpful information for solving problems that might occur with your system.

Chapter 9 Upgrading Your Server
provides you with instructions for upgrading your system with an additional processor, optional memory, optional add-in cards, hard disk drives, peripheral devices, and power supply.

Appendix A Specification
provides specifications for your server.

Appendix B Other Precautions
provides supplementary notes on using the server.

Appendix C IRQ and I/O Port Address
provides a list of factory-set IRQs and I/O port addresses assigned.

Appendix D Installing Windows Server 2003 x64 Editions
describes how to install Microsoft Windows Server 2003 x64 Editions without using Express Setup. Using the Express Setup tool is recommended for installing Windows Server 2003 x64 Editions. See Chapter 5 for details.

Appendix E Installing Windows Server 2003
describes how to install Microsoft Windows Server 2003 without using Express Setup. Using the Express Setup tool is recommended for installing Windows Server 2003. See Chapter 5 for details.

Appendix F Using a Client Computer Which Has a CD Drive
describes how to install the management software of EXPRESSBUILDER to the client computer without the DVD drive.

Appendix G Product Configuration Record Table
provides a table to be filled with your server configuration.

Text Conventions

The following conventions are used throughout this User's Guide. For safety symbols, see "SAFETY INDICATIONS" provided earlier.

IMPORTANT:	Items that are mandatory or require attention when using the server
NOTE:	Helpful and convenient piece of information

IN THE PACKAGE

The carton contains various accessories, as well as the server itself. See the packing list or "Getting Started" guide to make sure that you have everything and that individual components are not damaged. If you find any component missing or damaged, contact your service representative.

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Chapter 1

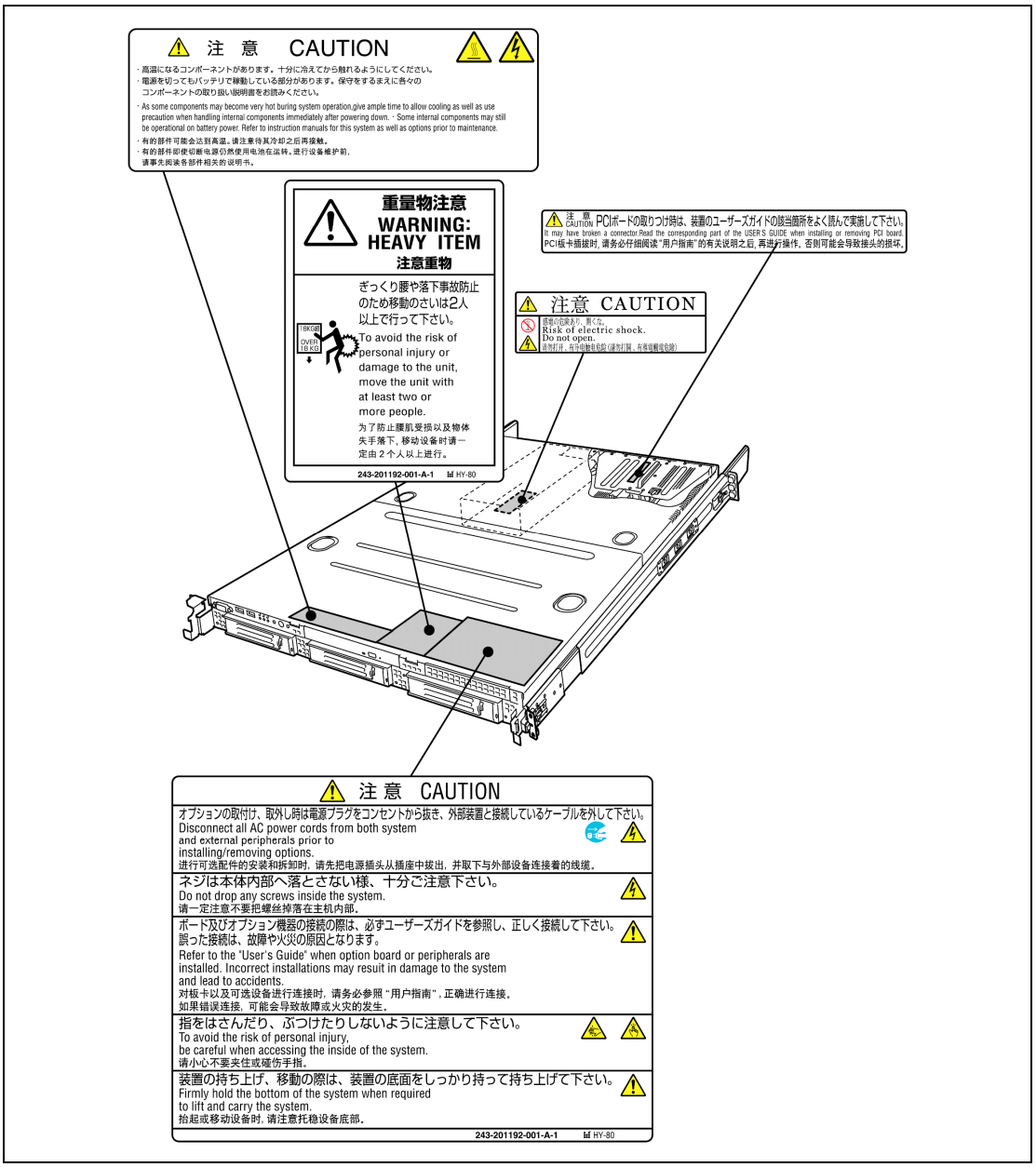
Notes on Using Your Server

This chapter includes information necessary for proper and safe operation of the server.

WARNING LABELS

The warning label is attached to components with possible danger or their vicinity in your server to inform the user that a hazardous situation may arise when operating the server. (Do not intentionally remove or damage any of the labels.)

If you find any labels totally/partially removed or illegible due to damage, contact your sales representative.


注 意 CAUTION
・高温になるコンポーネントがあります。十分に冷えてから触れるようにしてください。
・電源を切ってもバッテリで稼動している部分があります。保守をするまえに各々のコンポーネントの取り扱い説明書をお読みください。
・As some components may become very hot during system operation,give ample time to allow cooling as well as use precaution when handling internal components immediately after powering down. ・ Some internal components may still be operational on battery power. Refer to instruction manuals for this system as well as options prior to maintenance.
・有的部件可能会达到高温。请注意待其冷却之后再接触。
・有的部件即使切断电源仍然使用电池在运转。进行设备维护前，请事先阅读各部件相关的说明书。
重量物注意
WARNING: HEAVY ITEM
注意重物
ぎっくり腰や落下事故防止のため移動のさいは2人以上で行って下さい。
To avoid the risk of personal injury or damage to the unit, move the unit with at least two or more people.
为了防止腰肌受损以及物体失手落下，移动设备时请一定由２个人以上进行。
18KGS OVER 18 KG
243-201192-001-A-1 HY-80
注 意 CAUTION
PCIボードの取りつけ時は、装置のユーザーズガイドの該当箇所をよく読んで実施して下さい。
It may have broken a connector.Read the corresponding part of the USER'S GUIDE when installing or removing PCI board.
PCI板卡插拔时，请务必仔细阅读"用户指南"的有关说明之后，再进行操作。否则可能会导致接头的损坏。
注意 CAUTION
Risk of electric shock.
Do not open.
注 意 CAUTION
オプションの取付け、取外し時は電源プラグをコンセントから抜き、外部装置と接続しているケーブルを外して下さい。
Disconnect all AC power cords from both system and external peripherals prior to installing/removing options.
进行可选配件的安装和拆卸时，请先把电源插头从插座中拔出，并取下与外部设备连接着的线缆。
ネジは本体内部へ落とさない様、十分ご注意下さい。
Do not drop any screws inside the system.
请一定注意不要把螺丝掉落在主机内部。
ボード及びオプション機器の接続の際は、必ずユーザーズガイドを参照し、正しく接続して下さい。
誤った接続は、故障や火災の原因となります。
Refer to the "User's Guide" when option board or peripherals are installed. Incorrect installations may result in damage to the system and lead to accidents.
对板卡以及可选设备进行连接时，请务必参照"用户指南"，正确进行连接。
如果错误连接，可能会导致故障或火灾的发生。
指をはさんだり、ぶつけたりしないように注意して下さい。
To avoid the risk of personal injury, be careful when accessing the inside of the system.
请小心不要夹住或碰伤手指。
装置の持ち上げ、移動の際は、装置の底面をしっかり持って持ち上げて下さい。
Firmly hold the bottom of the system when required to lift and carry the system.
抬起或移动设备时，请注意托稳设备底部。
243-201192-001-A-1 HY-80

SAFETY NOTES

This section provides notes on using the server safely. Read this section carefully to ensure proper and safe use of the server. For symbols, see "SAFETY INDICATIONS" provided earlier.

For part names described in the safety instruction chapter in this guide, see Chapter 2.

General

⚠ WARNING

Do not use the server for services where critical high availability may directly affect human lives.

Your server is not intended to be used with or control facilities or devices concerning human lives, including medical devices, nuclear facilities and devices, aeronautics and space devices, transportation facilities and devices; and facilities and devices requiring high reliability. NEC assumes no liability for any accident resulting in personal injury, death, or property damage if the server has been used in the above conditions.

Do not use the server if any smoke, odor, or noise is present.

If smoke, odor, or noise is present, immediately turn off the server and disconnect the power plug from the outlet, then contact your service representative. Using the server in such conditions may cause a fire.

Keep needles or metal objects away from the server.

Do not insert needles or metal objects into ventilation holes in the server or openings in the optical disk drive. Doing so may cause an electric shock.

Do not use the server in any unapproved place.

Install the server on a standard EIA 19-inch rack assembly. Do not install the rack containing the server in a place inappropriate to the rack installation environment.
Failure to follow these instructions may cause some bad influences to be imposed on the server and other systems installed on the rack and also a fire or personal injury due to falling of the rack may occur. For the detailed explanation on the place where the server should be installed and the earthquake-resistant construction for the rack, refer to the manual attached to the rack or contact you service representative.

Always install the server on a rack conforming to the relevant standard.

Install the server on a rack confirming to the EIA standard for the Server to be used. Do not use the server with installed on any other rack than standard EIA 19-inch rack or without the installation on a proper rack. Failure to follow these instructions may cause the server to operate incorrectly and/or personal injury or damages of surrounding devices to occur. Contact your service representative for the racks available for the server.

⚠ CAUTION

Keep water or foreign matter away from the server.

Do not let any form of liquid (water etc.) or foreign matter (e.g., pins or paper clips) enter the server. Failure to follow this warning may cause an electric shock, a fire, or a failure of the server. When such things accidentally enter the server, immediately turn off the power and disconnect the power plug from the outlet. Do not disassemble the server. Contact your service representative.

Power Supply and Power Cord Use

⚠ WARNING

Do not hold the power plug with a wet hand.

Do not disconnect/connect the plug while your hands are wet. Failure to follow this warning may cause an electric shock.

Do not connect the ground wire to a gas pipe.

Never connect the ground wire to a gas pipe. Failure to follow this warning may cause a gas explosion.

⚠ CAUTION

Plug in to a proper power source.

Use a proper wall outlet. Use of an improper power source may cause a fire or a power leak.
Do not install the server where you need an extension cord. Use of a cord that does not meet the power specifications of the server may heat up the cord and cause a fire.

Do not connect the power cord to an outlet that has an illegal number of connections.

The electric current exceeding the rated flow overheats the outlet, which may cause a fire.

Insert the power plug into the outlet as far as it goes.

Heat generation resulting from a halfway inserted power plug (imperfect contact) may cause a fire. Heat will also be generated if condensation is formed on dusty blades of the halfway inserted plug, increasing the possibility of fire.

Use the authorized power cord only.

Use only the power cord that comes with your server. Use of an unauthorized power cord may cause a fire when the electric current exceeds the rated flow. Also, observe the following to prevent an electric shock or fire caused by a damaged cord.

- Do not stretch the cord harness.
- Do not pinch the power cord.
- Do not bend the power cord.
- Keep chemicals away from the power cord.
- Do not twist the power cord.
- Do not place any object on the power cord.
- Do not bundle power cords.
- Do not alter, modify, or repair the power cord.
- Do not secure the power cord with staples or equivalents.
- Do not use any damaged power cord. (Replace a damaged power cord with a new one of the same specifications. Ask your service representative for replacement.)

Do not use the attached power cord for any other devices or usage.

The power cord that comes with your server is designed aiming to connect with this server and to use with the server, and its safety has been tested. Do not use the attached power cord for any other purpose. Doing so may cause a fire or an electric shock.

Rack

⚠ CAUTION

Do not carry or install the server only by a single person.

More than one person is required to carry or install the rack. Failure to follow this instruction may cause the rack to fall to result in personal injury and/or breakages of surrounding devices. In particular, a high rack (such as 44U rack) is unstable if it is not fixed by stabilizers. More than one person must always carry or install the rack while they support it.

Do not install the server so that the load may be concentrated on a specific point.

Install stabilizers on the rack so that the total load of the rack and devices mounted on the rack is not concentrated on a singe point or join more than one rack with each other to distribute the load. Failure to follow this instruction may cause the rack to fall to result in personal injury.

Do not install components on the server only by a single person.

More than one person is required to install parts including the doors and trays for the rack. Failure to follow this instruction may cause some parts to fall to be broken and/or to result in personal injury.

Insert hinges completely.

When installing the rack door, make sure that hinge pins at top and bottom of the door are completely inserted into the rack. Failure to follow this instruction may cause the door to fall to be broken and/or to result in personal injury.

Anchor the equipment rack.

The equipment rack must be anchored to an unmovable support to prevent it from falling over when one or more servers are extended in front of it on slide assemblies. The anchors must be able to withstand a force of up to 113 kg (250 lbs.) You must also consider the weight of any other device installed in the rack.

Do not leave more than one device being pulled out from the rack.

Pulling out more than one device from the rack may cause the rack to be fallen. Only pull out a single device from the rack at a time.

Do not provide the wiring for the server to exceed the rating of the power supply.

To prevent burns, fires, and device damages, the power supplied to the power supply in the rack shall not exceed the rating load of the power branch circuit. Contact your electric constructor or the local power company for the requirements on the wiring and installation of electric facilities.

Installation, Relocation, Storage, and Connection

⚠ WARNING

Disconnect the power cord(s) before installing or removing the server.

Make sure to power off the server and disconnect the power cord(s) from a power outlet before installing/removing the server. All voltage is removed only when the power cords are unplugged.

⚠ CAUTION

Never attempt to lift the server only by yourself.

The server weighs max. 21 kg (depending on its hardware configuration). Carrying the server only by yourself may strain your back. Hold the server firmly by its bottom with another person to carry it. Do not hold the front door to lift the server. The front door may be disengaged from the server, causing personal injury.

Do not install the server in any place other than specified.

Do not install the server in the following places or any place other than specified in this User's Guide. Failure to follow this instruction may cause a fire.

- a dusty place
- a humid place such as near a boiler
- a place exposed to direct sunlight
- an unstable place

Do not install the server on a rack with leaving covers removed.

Do not install the server on a rack with the cover being removed. Failure to follow this instruction may reduce the cooling effect in the server to result in some malfunction and/or dusts to enter the server to result in a fire or electric shock.

Do not pinch your finger with rails or other components.

Note sufficiently that your fingers may not be caught between a rail and another mechanical part or cut by a rail at installation or removal of the server from the rack.

Do not apply any load on the server pulled out from the rack.

Do not apply any load on the server pulled out from the rack. Doing so bends the frame of the server. Consequently, the server cannot be pushed back into the rack. Placing an object on the server may also cause personal injury if the server drops.

⚠ CAUTION

Do not connect any interface cable with the power cord of the server plugged to a power source.

Make sure to power off the server and unplug the power cord from a power outlet before installing/removing any optional internal device or connecting/disconnecting any interface cable to/from the server. If the server is off-powered but its power cord is plugged to a power source, touching an internal device, cable, or connector may cause an electric shock or a fire resulted from a short circuit.

Do not use any unauthorized interface cable.

Use only interface cables provided by NEC and locate a proper device and connector before connecting a cable. Using an authorized cable or connecting a cable to an improper destination may cause a short circuit, resulting in a fire. Also, observe the following notes on using and connecting an interface cable.

- Do not use any damaged cable connector.
- Do not step on the cable.
- Do not place any object on the cable.
- Do not use the server with loose cable connections.

Cleaning and Working with Internal Devices

⚠ WARNING

Do not disassemble, repair, or alter the server.

Never attempt to disassemble, repair, or alter the server on any occasion other than described in this User's Guide. Failure to follow this instruction may cause an electric shock or fire as well as malfunctions of the server.

Do not remove the lithium battery.

The server contains the lithium battery. Do not remove the battery. Placing the lithium close to a fire or in the water may cause an explosion.

When the server does not operate appropriately due to the dead lithium battery, contact your service representative. Do not disassemble the server to replace or recharge the battery by yourself.

Disconnect the power plug before cleaning the server.

Make sure to power off the server and disconnect the power plug from a power outlet before cleaning or installing/removing internal optional devices. Touching any internal device of the server with its power cord connected to a power source may cause an electric shock even of the server is off-powered.

Disconnect the power plug from the outlet occasionally and clean the plug with a dry cloth. Heat will be generated if condensation is formed on a dusty plug, which may cause a fire.

⚠ CAUTION

Avoid installation in extreme temperature conditions.

Immediately after the server is powered off, its internal components such as hard disk drives are very hot. Leave the server until its internal components fully cool down before installing/removing any component.

Make sure to complete board installation.

Always install a board firmly. An incompletely installed board may cause a contact failure, resulting in smoking or fire.

Do not touch any electrical components inside the server during the hot-swap replacement.

All power flows inside the server while the hot-swap replaceable components (hard disk and power supply). Do not touch the electrical components inside the server to avoid an electric shock.

During Operation

⚠ CAUTION

Do not pull out or remove the server from the rack unnecessarily.

Do not pull out or remove the server from the rack unnecessarily. Pulling out or removing the server from the rack may cause not only the server to operate incorrectly but also the server to fall on people to make them injured.

Stay away from the fan.

Keep your hand or hair away from the cooling fan on the rear of the server. Failure to follow this warning may get your hand or hair caught in the fan, resulting in injury.

Avoid contact with the server during thunderstorms.

Disconnect the power plug from the outlet when a thunderstorm is approaching. If it starts thundering before you disconnect the power plug, do not touch any part of the server including the cables. Failure to follow this warning may cause a fire or an electric shock.

Keep animals away from the server.

Failure to follow this warning may cause a fire or an electric shock.

Do not place any object on top of the server.

The server may fall and cause property damage to the surroundings.

Do not leave the server with its optical disk drive tray ejected.

Dust may enter the server through openings and cause malfunctions of the server. Any person may also bump it and get injured.

FOR PROPER OPERATION

Observe the following notes for successful operation of the server. Use of the server ignoring the notes will cause malfunctions or failures of the server.

- Install the rack assembly in a place that meets requirements for successful operation. For details, see Chapter 3, "Setting Up Your Server."
- The server is intended for installation in a Restricted Access Location, mounted above a non-combustible material.
- Make sure to power off the server before connecting or disconnecting cables between the server and peripheral devices.
- Verify that the access LED on the server is unlit before turning off the server or ejecting the floppy disk.
- The server management logic on your system board monitors and logs system voltage changes. When plugging the power cord to the system, you may experience 30 seconds delay from the time you press the POWER switch on the front panel. This is normal system operation and is required by the server management logic.
- Do not turn off the server until the POST (Power On Self-Test) completes. See Chapter 2 for details of POST.
- When you have just turned off the server, wait at least 30 seconds before turning it back on.
- When unplug the power cord(s) from the server, wait at least 30 seconds before re-pluging the power cord(s) to the server.
- Turn off the power and unplug the power cord from the outlet before relocating the server.
- Clean the server on a regular basis. (See Chapter 7 for cleaning.) Regular cleaning proactively prevents various failures of the server.
- Lightning may cause a momentary voltage drop. To prevent this problem, it is recommended to use of an uninterruptible power supply unit.
- Check and adjust the system clock before the operation if any of the following conditions is applicable.
  - After carriage of device
  - After storage of device
  - After the device is entered into the pause state under the environmental condition enduring device operation (temperature: 10°C - 35°C, humidity: 20% - 80%)
- Check the system clock at the rough rate of once per month. When the system clock is installed in a system requiring high time precision, it is recommended to use a time server (NTP server).
  If the system clock is remarkably delayed or advanced as the passage of time in spite of adjustment, contact your service representative to ask maintenance.

- Store the unit under the storage condition (temperature: –10°C - 55°C, humidity: 20% - 80%, without condensation) to allow built-in devices and the unit to operate correctly in the next operation.
- Make sure to use optional devices supported by the server. Some non-supported devices may be physically installed/connected but cause failures of the server as well as a malfunction of the server.
- NEC recommends you use NEC's genuine products. Some third-party products claim that they support the server. However, repair of the server due to a failure or damage resulted from use of such third-party products will be charged.
- Turn off the cellular phone or pager. Radio interference may cause malfunctions of the server.

TRANSFER TO THIRD PARTY

The following must be observed when you transfer (or sell) the server or software provided with the server to a third party:

Server Hardware

Make sure to provide this User's Guide along with the server to a third party.

Provided Software

To transfer or sell any software application that comes with the server to a third party, the following requirements must be satisfied:

- All provided software applications must be transferred and no backup copies must be retained.
- Transfer requirements listed in "Software License Agreement" that comes with each software application must be satisfied.
- Software applications that are not approved for transfer must be uninstalled before transferring the server.

DISPOSAL AND CONSUMABLES

- Dispose the server, all the internal devices and DVD-ROMs according to all national laws and regulations.

  IMPORTANT: For disposal (or replacement) of the battery on the mother board of the server, consult with your service representative.

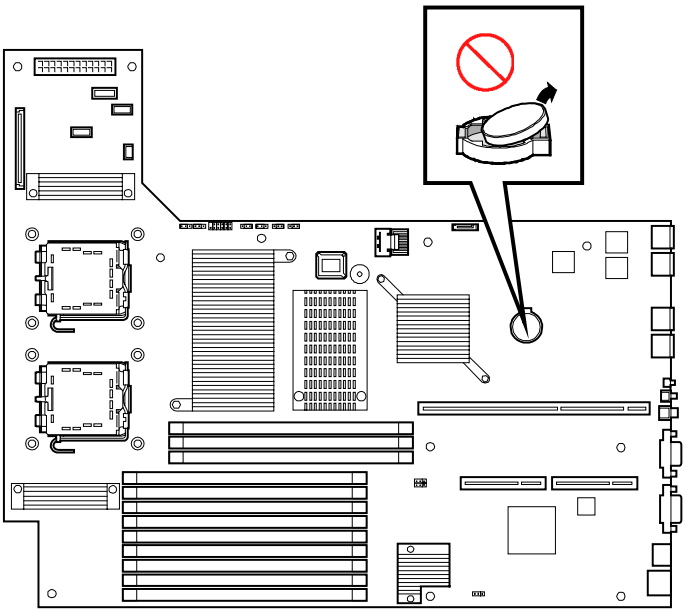
- The server contains some components that are only good for a limited period of time and require replacement, such as fans, internal batteries, the internal optical disk drive, and the mouse. For stable operation of the server, NEC recommends you replace these components on a regular basis. Consult with your service representative for replacement or the product lives.

WARNING

Do not remove the lithium battery.

The server contains the lithium battery. Do not remove the battery. Placing the lithium or nickel cadmium battery close to a fire or in the water may cause an explosion.

When the server does not operate appropriately due to the dead lithium battery, contact your service representative. Do not disassemble the server to replace or recharge the battery by yourself.



Mother board

USER SUPPORT

Before Asking for Repair, do the following when the server appears to fail:

1. Check if the power cord and the cables to other devices are properly connected.
2. See Chapter 8 to find if your problem fits the description. If it does, take the recommended measure for it.
3. Check if the software required for operation of the server is properly installed.

If the server still appears to fail after you have taken the above actions, consult with your service representative immediately. Take notes on LED indications of the server and alarm indications on the display unit before consultation, which may provide a significant help to your service representative.

Advice for Health

The longer you keep using the computer equipment, the more you become tired, which may cause disorders of your body. When you use a computer, observe the following to keep yourself from getting tired:

Good Working Posture

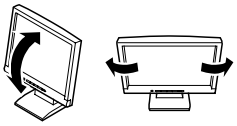
You have good posture if the following are satisfied when you use a computer:

- You sit on a chair with your back straight.
- Your hands are parallel with the floor when you put them on the keyboard.
- You look at the screen slightly lower than your eye height.

You have "good working posture" as described in the above when no part of your body is under excess strain, in other words when your muscles are most relaxed.

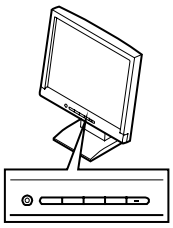
You have "bad posture" when you sit with your back hunched up or you operate a display unit with your face close to the screen. Bad working posture may cause eye strain or poor eyesight.

Adjustment of Display Unit Angles



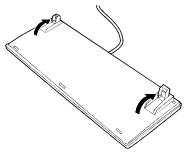
Most display units are designed for adjustment of the horizontal and vertical angles. This adjustment is important to prevent the screen from reflecting bright lights and to make the display contents easy to see. You will not be able to keep "good working posture" and you will feel more tired than you should if you operate a display unit without adjusting horizontal and vertical angles.

Adjustment of Screen Brightness and Contrast

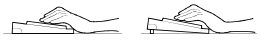


The display unit has brightness and contrast adjustment functions. The most suitable brightness and contrast depend on the individual and the working environment (well-lighted room or insufficient light). Adjust brightness and contrast so that the screen will be easy to see. An extremely bright or dark screen will give a bad effect to your eyes.

Adjustment of Keyboard Angle



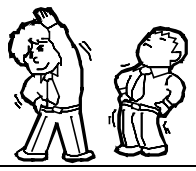
The keyboard provided with the server is designed for adjustment of an angle. Adjust the keyboard angle at which the keyboard is easy to operate. The adjustment assists in reducing strain on your shoulders, arms, and fingers.



Cleaning of Equipment

Clean equipment regularly. It is difficult to see the display contents on a dusty screen. Keeping equipment clean is also important for your sight.

Fatigue and Rest



If you feel tired, you should stop working and do light exercises.

Chapter 2

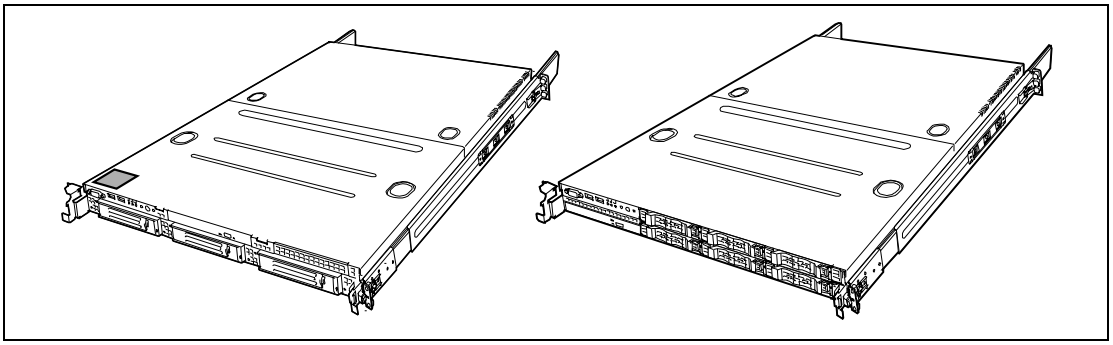
General Description

This chapter provides information that you should be familiar with before using the server. It includes names and functions of the components and features of the server.

OVERVIEW

Your server is a modular, multiprocessing server based on the Intel® Xeon® microprocessor. It is a solid performer and offers the latest technology. The combination of compute performance, memory capacity, and integrated I/O provides a high performance environment for many server market applications. These range from large corporations supporting remote offices to small companies looking to obtain basic connectivity capability such as file and print services, e-mail, web access, web site server, etc.

Your server is housed and available as a rack-mount system. Your server conveniently installs into a standard EIA 19-inch rack assembly.

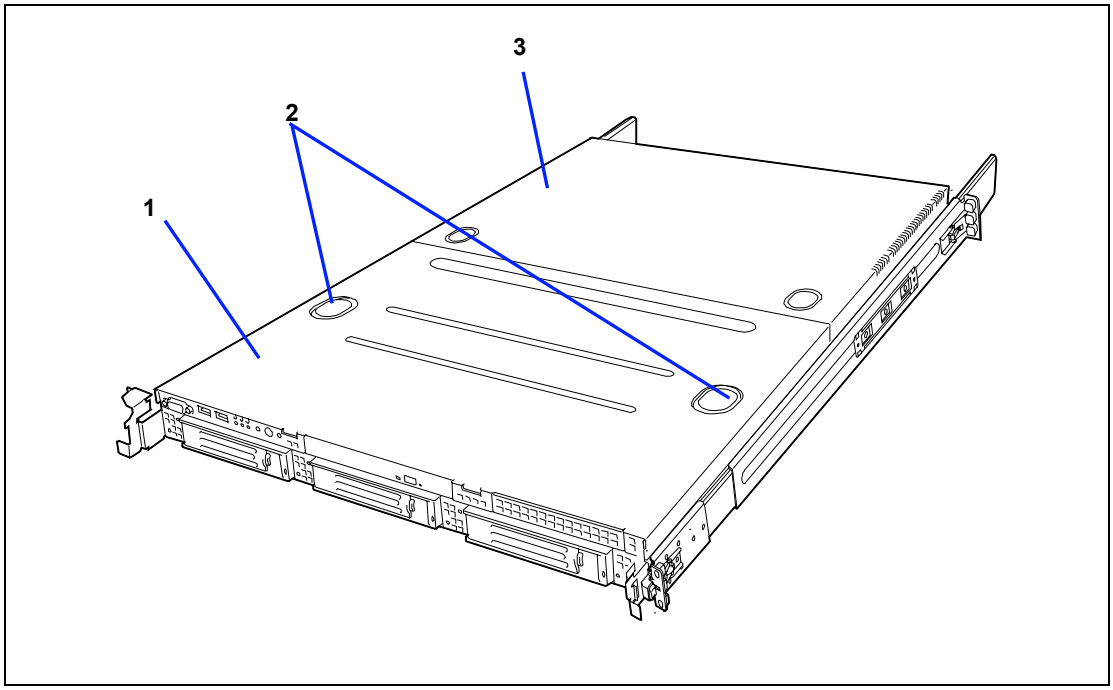


Your server includes a optical disc drive and three (SATA or SAS) or six (SAS) hard disk drive bays. The hot-swap hard disk drive bays support 1.0-inch hard disk drives that can be swapped in or out of the system without powering it down, if RAID functionality is configured in the system.

As application requirements increase, you can expand your server with an additional processor, additional memory, add-in boards and peripheral devices, and hard disk drives.

External View

The following figure shows the 3.5-inch disk model.



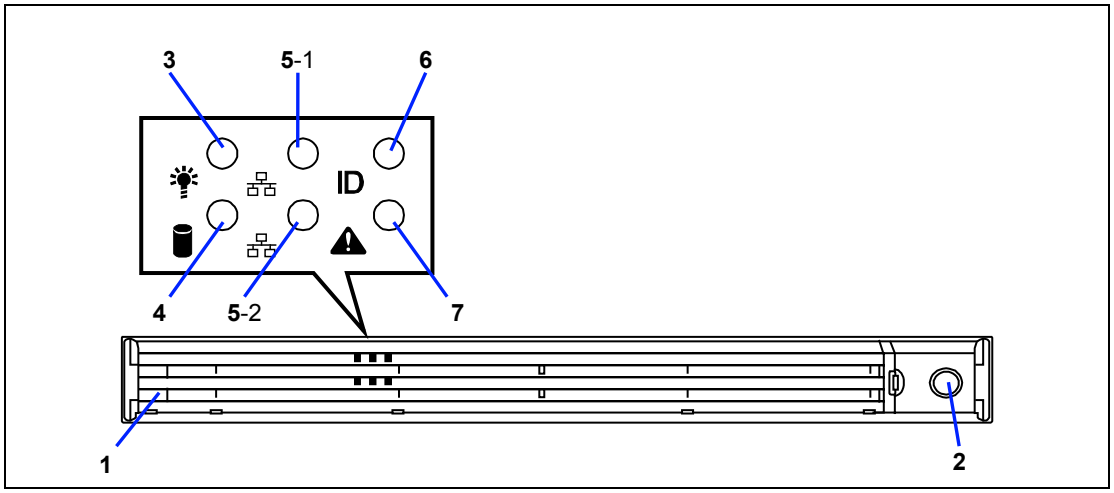
1 Drive cover

2 Release buttons

3 Logic cover

Front View with Front Bezel Closed

The following figure shows the location of the front system features.



1 Front bezel
The front bezel is a cover protecting the front devices during daily operation. A security key is provided to lock the cover.

2 Key slot
Insert the security key into this slot when unlocking the front bezel.

3 POWER LED (green)
This LED turns green when the power is turned on.

4 DISK ACCESS LED (green/amber)
This LED is green during access to the internal hard disk drives. The LED turns amber when even one of the internal hard disk drives fails.

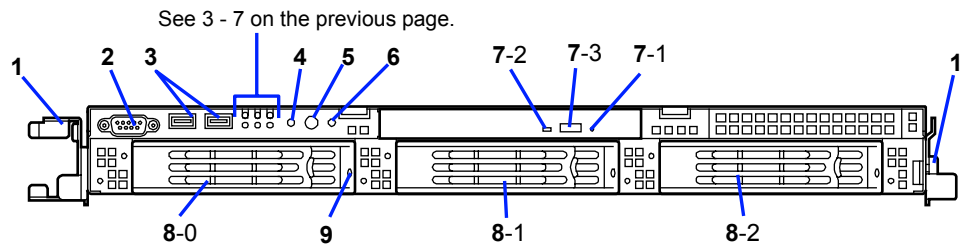
5 ACT LED (green)
This LED is on while the system is connected to the network. The number "1" on the icon indicates LAN port 1, and the number "2" indicates LAN port 2.

6 UID LED (blue)
This LED goes on when the UID switch is pressed. (The LED also goes on or flashes when software issues a command.)

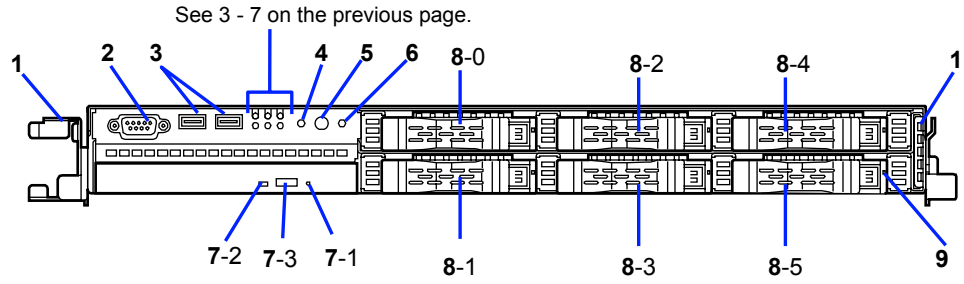
7 STATUS LED (green/amber) (on the front panel)
This LED indicates the server status. The LED is green during normal operation. The LED turns amber or flashes when the server enters the abnormal state.

Front View with Front Bezel Removed

3.5-inch disk model (SATA or SAS)



2.5-inch disk model (SAS)



1 **Handles (1 at the right and left each)**
Hold the handles when dismounting/mounting the server from/in the rack.

2 **Serial port B (COM B) connector**
Management port for connecting the personal computer having a serial interface to this connector.

3 **USB connectors (2 ports)**
Connect device compliant with the USB interface to the connectors.

4 **DUMP (NMI) switch**
Press this switch to dump system memory.

5 **POWER switch**
Press this switch to turn on/off the power. Pressing the switch once turns on the power, and the POWER LED goes on. Pressing it again turns off the power. Keep pressing the switch for 4 seconds or more forcibly turns off the power.

6 **UID (Unit ID) switch**
Press this switch to turn on/off the UID LEDs on the front and rear panels of the server. Pressing the switch once turns on the LEDs. Pressing it again turns them off.
(The LED also goes on or flashes when software issues a command.)

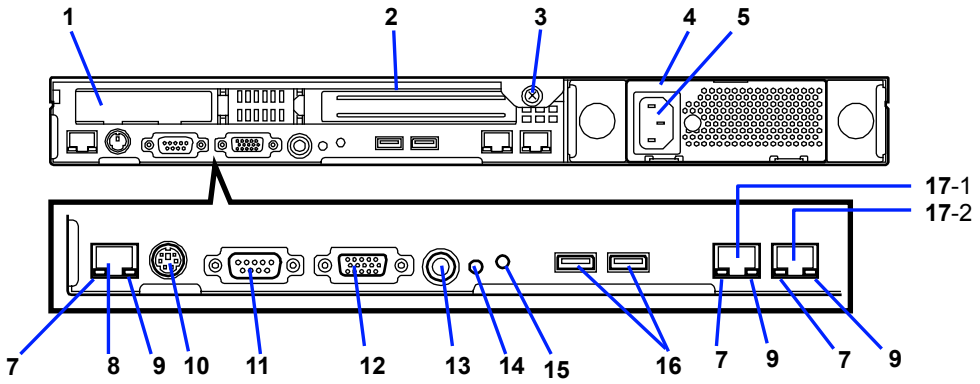
7 **Optical disk drive (optical disk drive)**
This drive reads data from the disc.
7-1 Emergency hole **7**-2 Disk access LED **7**-3 CD tray eject button

8 **Hard disk drive bays**
Mount hard disk drives in the bays. The last digit indicates the drive ID. The hard disk drives must be purchased separately.

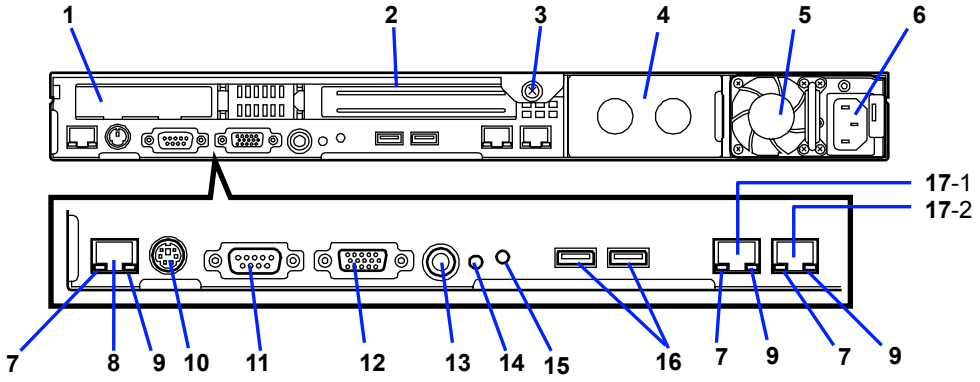
9 **DISK LED (green/amber)**
Hard disk drive LED. Each hard disk drive LED is green during access to the hard disk drive. The LED turns amber when the hard disk drive fails. The LED flashes switching back and forth between green and amber during build processing (only in RAID System).

Rear View

Non-redundant power supply model



Redundant power supply model



1 **Low-profile PCI board extension slot (1C)**
Mount PCI board of the low-profile type into this slot.

2 **Full-height PCI board extension slot (1B)**
Mount PCI board of the full-height type in the slot.
The slot "1B" of 2.5-inch disk model contains the factory-installed RAID controller (equivalent to N8103-116).

3 **Captive thumbscrew**
Secures the logic cover to the chassis.

4 **Redundant power supply slot**
Equipped on redundant power supply model only.
An optional slot for 1+1 redundant power configuration.

5 **Power supply**
Supplies DC power to the server.

6 **AC inlet**
Connect the power cord to this socket.

7 **LINK/ACT LED (green)**
This LED indicates the access status of the LAN.

8 **Management LAN port**
100BASE-TX/10BASE-T interface port used to manage the server via LAN.

9 **Speed LED (amber)**
This LED indicates the transmission speed of the LAN.

10 **Mouse/keyboard connectors**
Connect the mouse and keyboard to the connectors through the provided relay cables.

11 **Serial port A (COM A) connector**
Connect device having a serial interface to this connector.
A leased line cannot be connected directly to this connector.

12 **Monitor connector**
Connect the display unit to this connector.

13 **UID switch**
Press this switch to turn on/off the UID LEDs on the front and rear panels of the server.
Pressing the switch once turns on the LEDs. Pressing it again turns them off.

14 **DUMP (NMI) switch**
Press this switch to dump system memory.

15 **UID LED (blue)**
This LED goes on when the UID switch is pressed. (The LED also goes on when software issues a command.)

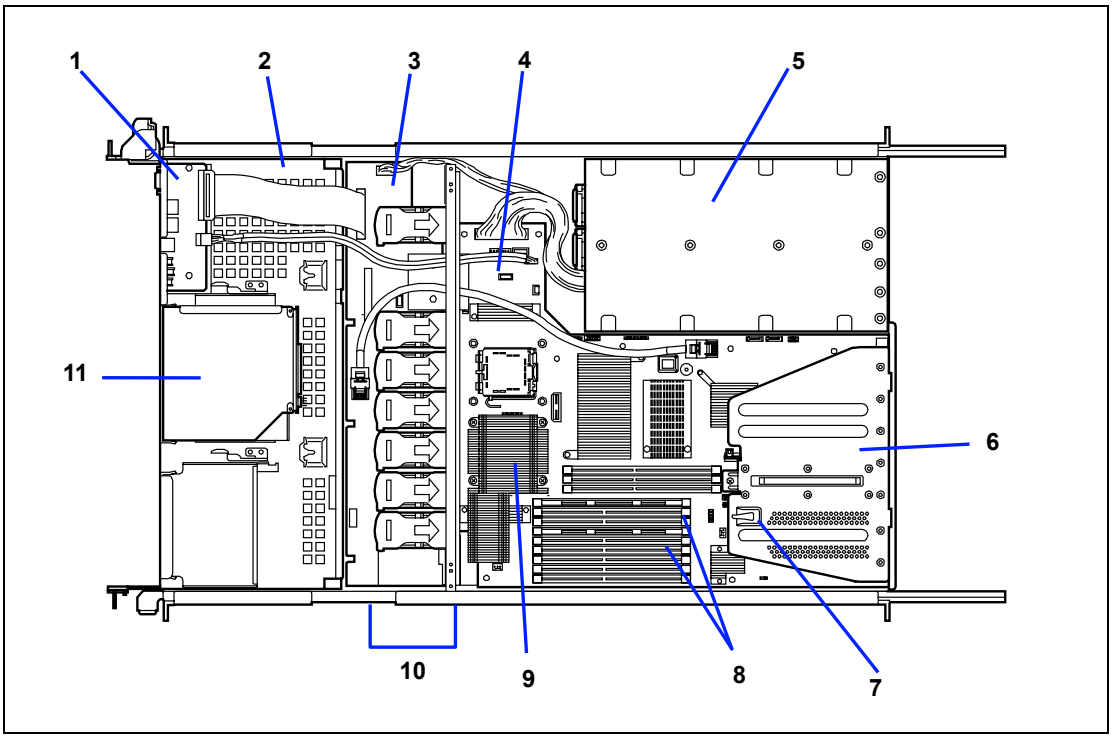
16 **USB connectors**
Connect device compliant with the USB interface to this connector.

17 **LAN connectors**
Connect network systems on the LAN to the connectors (1000BASE-T/100BASE-TX/10BASE-T).
The number "1" following the bold-faced number indicates LAN port 1, and the number "2" indicates LAN port 2.

Internal View

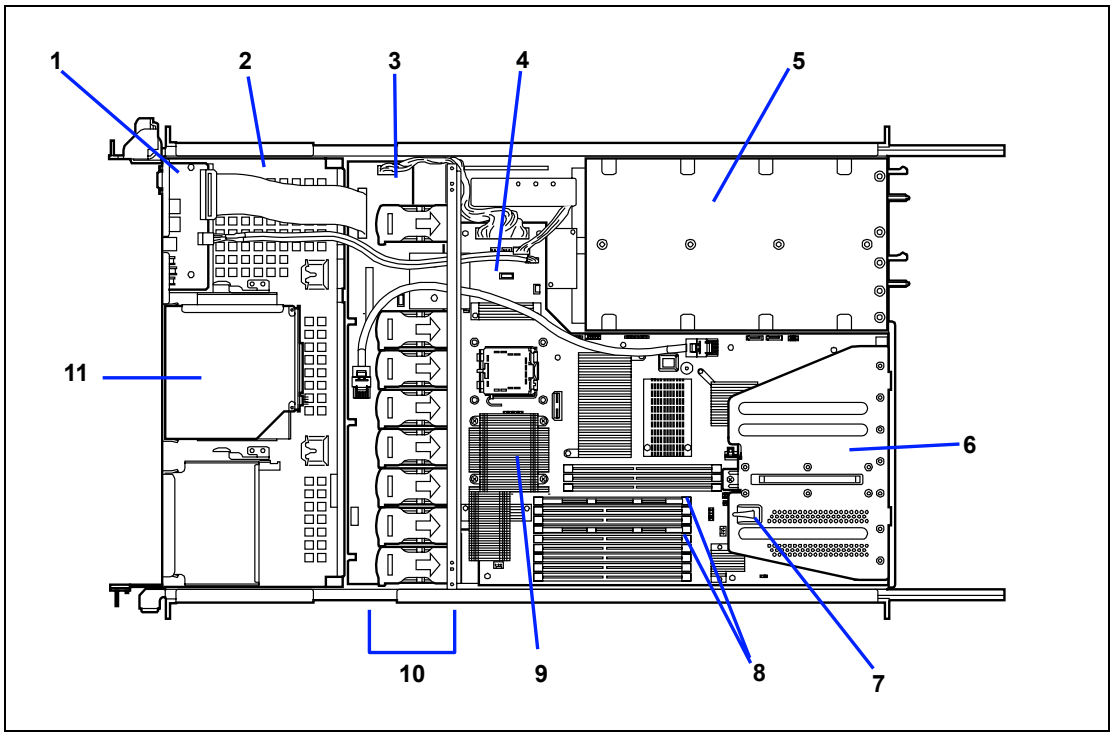
The internal view for each models show below. The processor air duct factory-installed in the system is omitted for clarity.

3.5-inch Disk with Non-redundant Power Supply Model



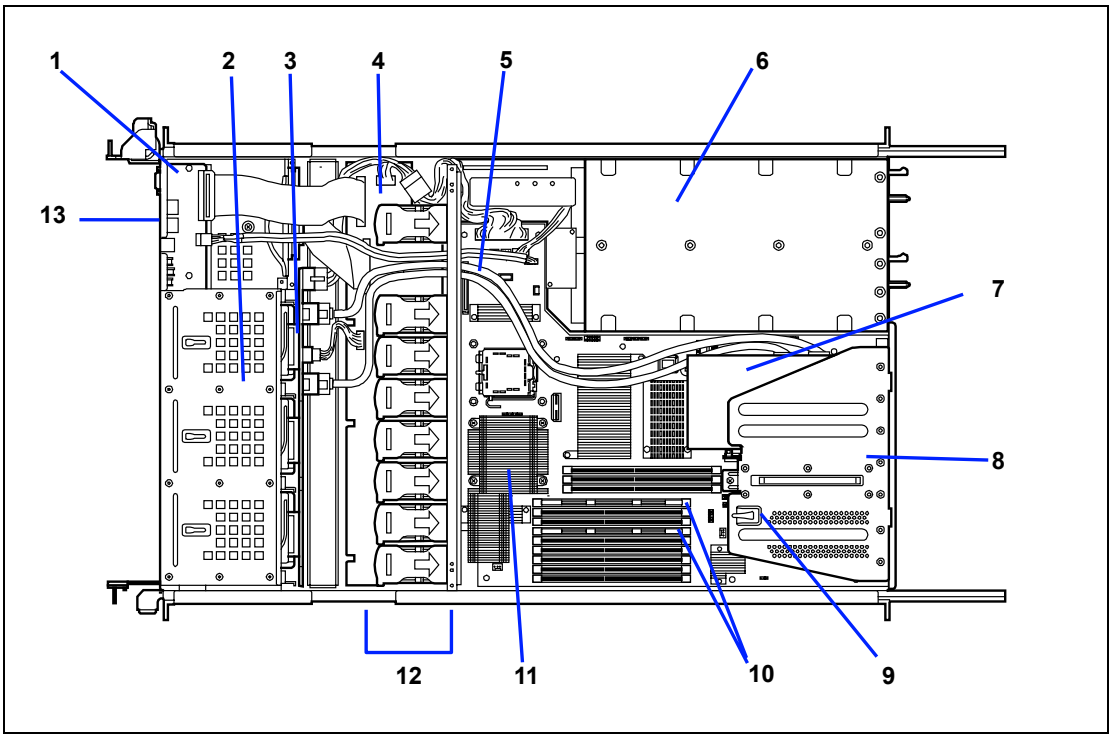
1 **Front panel board**
2 **Hard disk drive bays**
3 **Backplane**
4 **Mother board**
5 **Power supply**
6 **Riser card module assembly**
7 **Chassis intrusion switch**
8 **DIMMs**
9 **Processor** (mounted under the CPU and heat sink)
10 **Cooling fans**
11 **optical disk drive**

3.5-inch Disk with Redundant Power Supply Model



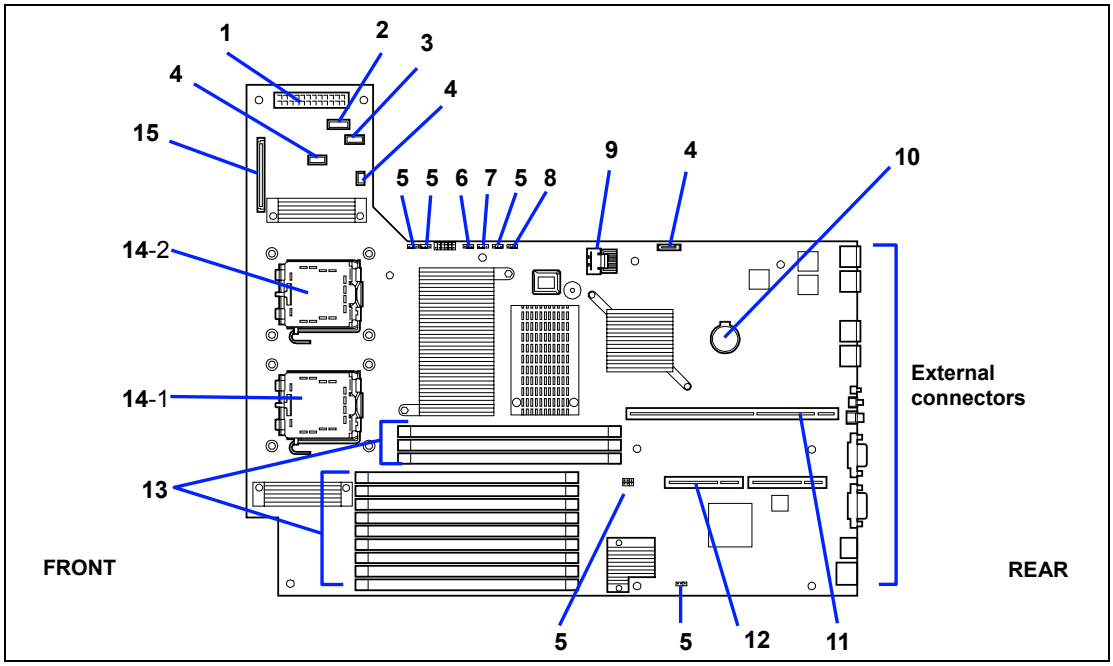
1 **Front panel board**
2 **Hard disk drive bays**
3 **Backplane**
4 **Mother board**
5 **Power supply**
6 **Riser card module assembly**
7 **Chassis intrusion switch**
8 **DIMM**
9 **Processor** (mounted under the CPU and heat sink)
10 **Cooling fans**
11 **Optical disk drive**

2.5-inch Disk Model



1 **Front panel board**
2 **Hard disk drive bays**
3 **Backplane**
4 **Middle-plane**
5 **Mother board**
6 **Power supply**
7 **RAID board**
RAID controller (equivalent to N8103-116) is factory-installed in slot "1B".
8 **PCI riser card**
9 **Top cover sensor**
10 **DIMM**
11 **Processor** (mounted under the CPU and heat sink)
12 **Cooling fans**
13 **Optical disk drive**

Mother Board



1 **Power connector**
2 **Power signal connector**
3 **USB connector**
4 **Unused connector**
5 **Unused jumper switch**
6 **RAID configuration jumper switch**
With 2.5-inch disk model, leave the factory setting as is.
7 **Password clear jumper switch**
8 **CMOS clear jumper switch**
9 **Mini SAS connector**
Used only when 3.5-inch SATA2 hard disk drive is installed.
10 **Lithium battery**
11 **Connector for PCI riser card slot (for full-height board)**
(See Chapter 9 for available board.)
12 **Connector for PCI riser card slot (for low-profile board)**
(See Chapter 9 for available board.)
13 **DIMM sockets (for interleave type)**
(The sockets are called 41, 42, 43, 11, 12, 13, 21, 22, 23, 31, 32, 33 sequentially from top.)
14 **Processor sockets**
13-1 Processor #1 (CPU #1) **13**-2 Processor #2 (CPU #2)
15 **Backplane connector**

STATUS INDICATORS

This section explains the indication and meanings of the server LEDs.

POWER LED ( )

The POWER LED is on (green) while the server power switch is on. It is off while no power is supplied to the server.

The POWER LED indicates that the server is running in the power-saving mode (sleep mode). If the OS supports the power-saving mode such as Windows Server 2003, running the command blinks the POWER LED in green and place the server in the power-saving mode. Press the POWER switch to turn out the POWER LED and place the server back in the normal mode.

The power-saving mode is only available when the OS supports the power-saving feature. Some OS's allow you to set the server to automatically turn in the power-saving mode when no access is made to the server for a certain period of time or to select the power-saving mode with a command.

STATUS LED ( )

The STATUS LED is on (green) while the server is operating normally. If the STATUS LED is off or turns amber and flashes, it indicates that the server is in abnormal state.

The table below explains the STATUS LED indication, the meanings, and the procedures.

NOTES:

- If NEC ESMPRO is installed, you can confirm the cause of a failure by referring to the error log.
- If shutdown processing can be performed through the operating system when you want to restart the system after turning the power off, restart the system by performing shutdown processing. If shutdown processing cannot be performed, restart the system by resetting, forcibly turning the power off, or disconnecting and then connecting the power cord.

STATUS LED indication	Description	Procedure
On (green)	The server is operating normally.	–
Flashing (green)	• The server is operating with the memory or CPU in degraded state. • An uncorrectable memory error has often occurred.	Identify the device in degraded state by using the BIOS setup utility "SETUP," and replace it as soon as possible.
Off	The power is off.	–
	POST is in progress.	Wait for a while. The STATUS LED turns green when POST is completed.
	A CPU error occurred. (IERR)	Turn the power off and then turn it on. If the POST screen displays an error message, take notes of the message, and contact your sales representative.
	A CPU temperature alarm was detected.	
	A timeout occurred when the time set for the watchdog timer arrived.	
	A CPU bus error occurred.	
	A memory dump request is made.	Wait until the memory dump is completed.
On (amber)	A temperature alarm was detected.	Check if the internal fans are clean and if the fan units are firmly connected. If the STATUS LED indication does not change when the fans are normal, contact your sales representative.
	A voltage alarm was detected.	Contact your sales representative.
	All the power supply units failed.	
Flashing (amber)	Either of the following was detected in the redundant power configuration: • AC power not supplied to one of the two power supply units • Failure of one of the two power supply units	Connect the power cord to supply power. If the power supply unit is faulty, contact your service representative.
	A fan alarm was detected.	Check if the fan units are firmly connected. If the STATUS LED indication does not change when the fans are normal, contact your sales representative.
	A temperature warning was detected.	Check if the internal fans are clean and if the fan units are firmly connected. If the STATUS LED indication does not change when the fans are normal, contact your sales representative.
	A voltage warning was detected	Contact your service representative.
	An error was detected on either of the hard disk drives.	

DISK ACCESS LED ( )

The DISK ACCESS LED indicates the status of the hard disk drive mounted in the 3.5-inch disk bay.

The LED turns green each time access is made to the hard disk drive.

When the DISK ACCESS LED turns amber, it indicates that a hard disk drive failure has occurred. Check the hard disk drive LED for the status of the failing hard disk drive.

ACT LED ( )

The ACT LED is green while the server is connected to the LAN. The LED flashes while the server is accessed via the LAN (during transmission/reception of packets). The number next to the icon indicates the network port number on the rear panel of the server.

UID LED (UID)

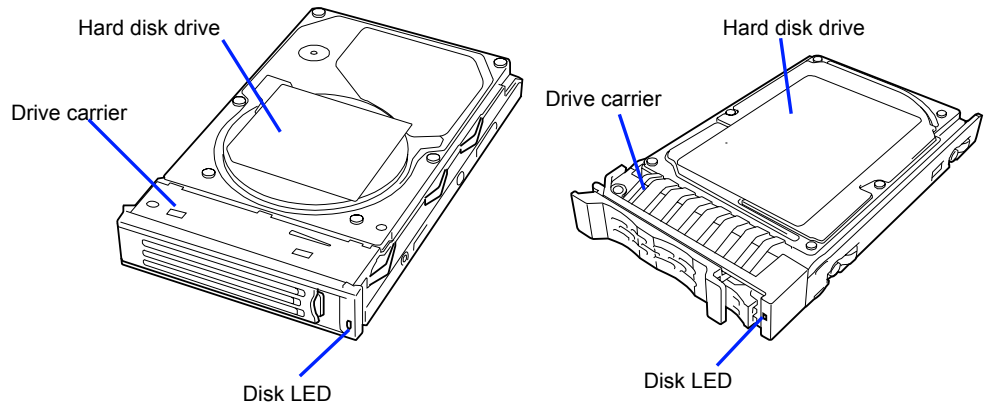
Pressing the UID switch toggles the front panel UID LED (blue) and the mother board UID LED on and off. The mother board UID LED is visible through the rear of the chassis and allows you to locate the server you're working on from the rear of the servers on a rack.

Disk Access LED

The disk access LED of the optical disk drive is on while the drive is accessed.

Hard Disk Drive LED

The disk LED located on the drive carrier indicates the following depending on the status:



3.5-inch hard disk drive 2.5-inch hard disk drive

- Flashing (green)

  The LED indicates that the hard disk drive is accessed.

- On (amber)

  The LED indicates a failure of a hard disk drive mounted in RAID System.

  NOTE: Even if one (two hard disk drives in RAID6) of the hard disk drives fails in Logical Drive (RAID1, RAID5, or RAID6), the server can continue operation. However, replace the hard disk drive as soon as possible, and perform reconstruction (rebuild) processing. (The failing hard disk drive can be replaced in hot swap mode.)

- Flashing switching back and forth between green and amber

  The LED indicates that reconstruction (rebuild) processing is being performed for the hard disk drive. (This flashing does not indicate a failure.) When a failing hard disk drive is replaced in RAID System, the system automatically rebuilds the data. (Auto-rebuild function) The LED switches back and forth between green and amber during rebuild processing.

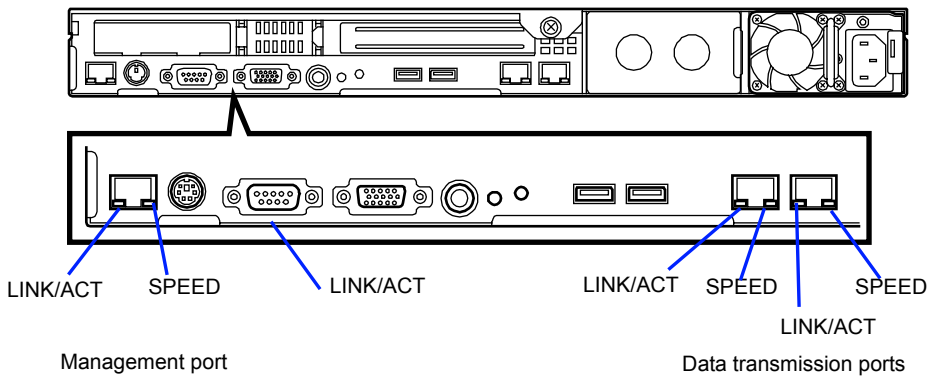
  The LED goes off when the rebuild processing has terminated. It turns amber when the rebuild processing fails.

IMPORTANT: If the server is turned off during rebuild processing, the processing is stopped. Restart the server, mount the new hard disk drive in hot swap mode, and then perform rebuild processing again. Observe the following notes on using the auto-rebuild function.

- Do not turn the power off. (Once the power is turned off, the auto-build function does not start.)
- Let 90 seconds or more pass between when dismounting a failing hard disk drive and when mounting the new one.
- Do not replace a failing hard disk drive while rebuild processing is being performed for another hard disk drive.

LAN Connector LEDs

There are two LEDs for each of the two LAN ports (connectors) on the rear panel.



- LINK/ACT LEDs

  Each LINK/ACT LED indicates the status of the standard network port of the server. While power is supplied to the server and HUB and the connection is correct, the LED is on (green). The LED turns green and flashes while the network port is transmitting/receiving data.

  If the LED does not go on when the LINK state is placed, check if the network cable is in normal state and if it is connected correctly. If the LED does not go on yet when the network cable is normal, the network (LAN) controller may be faulty. In this case, contact your sales representative.

- Speed LEDs (for data transmission ports)

  This LED indicates whether each of the network ports normally equipped with the server is operated through the 1000BASE-T, 100BASE-TX or 10BASE-T network interface. If the LED is lit amber, the network port is operated through 1000BASE-T. If the LED is lit green, the network port is operated through 100BASE-TX. If the LED is off, the network port is operated through 10BASE-T.

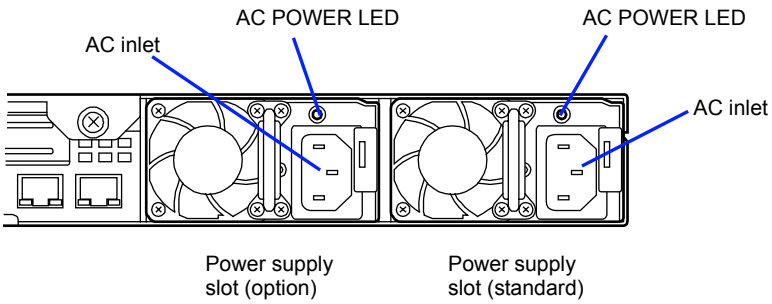
- Speed LED (for management port)

  This LED indicates whether each of the network ports normally equipped with the server is operated through the 100BASE-TX or 10BASE-T network interface. If the LED is lit amber, the network port is operated through 100BASE-TX. If the LED is off, the network port is operated through 10BASE-T.

AC POWER LED (Redundant Power Supply Model)

There is an AC POWER LED for the power supply unit on the rear. The LED turns green and flashes when the power supply unit receives AC power from the power cord, which is connected to the AC inlet. (Flashing amber indicates no AC power is received in any one of two power supplies in the redundant configuration.)

The LED turns green when the server power switch is turned on. If the LED does not go on when the server power switch is turned on or if it turns amber, the power supply unit is probably faulty. In this case, contact your service representative to replace the power supply unit.

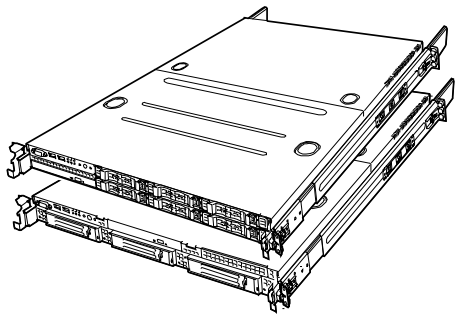


NOTE: If one power supply unit fails while an optional power supply is mounted, the system can continue operation with the other power supply unit (redundant function). The failing power supply unit can be replaced in hot swap mode (with the power on) without the system being stopped.

STANDARD FEATURES

High performance

- Quad-core Intel® Xeon® Processor
  N8100-1390F/1396F: 2.00GHz
  N8100-1391F/1397F: 2.50GHz
  N8100-1438F/1439F: 3.00GHz
  N8100-1392F/1398F/1405F: 3.16GHz
- High-speed memory access (DDR2-667)
- High-speed network interface (1000Mbps/100Mbps/10Mbps supported)
- High-speed disk access (SATAII 300/Serial Attached SCSI) *1



Expandability

- PCI Express (x8): 1 slot (low profile)
  PCI Express (x8): 1 slot (full height) *3
- Large memory of up to 48GB
- Up to two multi-processors are available for upgrade.
- Three network ports (one for management LAN)
- Hard disk drive bays
  3.5-inch disk model: up to 3 hard disk drives
  2.5-inch disk model: up to 6 hard disk drives
- One backup file bay
- USB2.0 interface

Management Utilities

- NEC ESMPRO
- NEC DianaScope
- RAID System Management Utility
- Power monitoring feature
- Hard disk drive monitoring feature

Maintenance Features

- Off-line Maintenance Utility
- Memory dump feature using the DUMP switch

High-reliability

- Memory monitoring feature (error correction/error detection)
- CPU/memory degradation feature (logical isolation of a failed device)
- Memory x4/x8 SDDC feature
- Memory mirroring/online spare memory feature
- Bus parity error detection
- Temperature detection
- Error notification
- Internal fan monitoring feature
- Internal voltage monitoring feature
- Redundant power supply (hot-swap) *2
- Onboard RAID Controller (LSI Embedded MegaRAID)
  Internal RAID Controller (equivalent to N8103-116)
- Auto-rebuild feature (hot-swappable)
- BIOS password feature
- Mechanical security lock
- Redundant fans

Many Available Features

- Redundant power supply feature (with optional power supply unit installed) *2
- El Torito Bootable CD-ROM (no emulation mode) format support
- POWER switch mask
- Software power-off
- Remote power-on feature
- AC-Link feature
- Remote console feature

Self-diagnosis

- Power On Self-Test (POST)
- Test and Diagnosis (T&D)

Easy and Fine Setup

- NEC EXPRESSBUILDER (system setup utility)
- Parameter File Creator
- SETUP (BIOS configuration utility)

*1 2.5-inch disk model server supports SAS hard disk drive only
*2 Redundant power supply model only
*3 With 2.5-inch disk model, the factory-installed RAID controller occupies the slot.

Remote Management Feature

Server management is concentrated in the Remote Management Controller (RMC). The RMC and associated circuitry are powered from a 5Vdc standby voltage, which remains active when system power is switched off, but the ac power source is still on and connected.

The RMC supports the NEC DianaScope, which allows remote server management through networks. Events monitored by the manager system include over-temperature and over-voltage conditions, fan failure, or chassis intrusion.

Information on NEC DianaScope may be found in the NEC EXPRESSBUILDER DVD.

One major function of the RMC is to autonomously monitor system management events, and log their occurrence in the nonvolatile System Event Log (SEL). The events being monitored include overtemperature and overvoltage conditions, fan failure, or chassis intrusion. To enable accurate monitoring, the RMC maintains the nonvolatile Sensor Data Records (SDRs), from which sensor information can be retrieved. The RMC provides an ISA host interface to SCR sensor information, so that software running on the server can poll and retrieve the server's current status.

The RMC performs the following:

- Monitors server board temperature and voltage*
- Monitors processor presence and controls Fault Resilient Boot (FRB)
- Detects and indicates baseboard fan failure*
- Manages the SEL interface
- Manages the SDR Repository interface
- Monitors the SDR/SEL timestamp clock
- Monitors the system management watchdog timer
- Monitors the periodic SMI timer
- Monitors the event receiver
- Controls secure mode, including video blanking, diskette write-protect monitoring, and front panel lock/unlock initiation
- Controls Wake On LAN via Magic Packet support.
- Monitors the hard disk drives

*Also, NEC ESMPRO supports these features.

NOTE: To use the Remote Management Extended License (N8115-03), visit our Web site to see the latest information about remote console/remote media feature.

Degradation Feature

The degradation feature automatically isolates a failed DIMM or processor to assure continuous operation of the server when the POST (Power On Self-Test, self-diagnosis program after power on) detects such a DIMM or processor.

> **NOTE:** The degradation feature is only available when at least two DIMMs or processors are installed.

Failed DIMMs and processors may be identified on the screen that the POST displays, or with the BIOS setup utility of the server, "SETUP." They may also be identified on the system that has the NEC ESMPRO installed.

Memory RAS Features

Your server board has the memory mirroring and online spare memory features. For detail explanation, refer to Chapter 9.

Remote Power-On Feature (Wake On LAN)

The remote power-on function turns on the server through a network. It sends a special packet from the management computer to a remote server to turn it on if the server is off-powered.

To enable this feature, use the BIOS setup utility, "SETUP." (See Chapter 4.)

The remote power-on feature is not available in the following cases. Press the POWER switch once to start the OS, and turn off the server in an appropriate procedure.

- Abnormal previous system shut-down
- No power supply to the server (due to turned-off breaker, disconnected power cord, power blackout, etc.)

AC-Link Feature

When the power cord of the server is connected to an uninterruptible power supply (UPS) unit, the server supports the power linkage feature that enables control over the power supply from the UPS to the server. The AC-Link feature can be enabled or disabled with the Server menu of the BIOS setup utility, "SETUP." (See Chapter 4.)

System Security

To help prevent unauthorized entry or use of the system, the system includes a full lockable front bezel and Server Management software that monitors the front bezel intrusion switch.

Security with Mechanical Locks and Monitoring

To unlock the bezel, insert the key in the lock and turn the lock counterclockwise until it stops (about a quarter turn). The bezel is now unlocked and can be opened again.

To lock the bezel, insert the key in the lock. Turn the lock clockwise until it stops (about a quarter turn). The bezel is now locked and cannot be opened.

Software Locks via the BIOS SETUP Utility

The BIOS SETUP Utility provides a number of security features to prevent unauthorized or accidental access to the system. Once the security measures are enabled, you can access the system only after you enter the correct password(s). For example:

- Mask the power switch function after the power-on.
- Set and enable a supervisor password.
- Set and enable a user password.
- Disable access to the boot sector of the operating system hard disk drive.

NEC EXPRESSBUILDER

The DVD-ROM that comes with the server contains a setup utility called "NEC EXPRESSBUILDER."

The major functions of the NEC EXPRESSBUILDER are:

- To install the Operating System.
  "Express Setup" helps you to install the Windows Operating System. (See Chapter 5)
- To diagnose the system.
  NEC EXPRESSBUILDER includes the System Diagnostics to check your server. (See Chapter 6)
- To create a support disk.
  Use this function to create the support disks used to boot the utilities from the floppy disk, or the OEM-disk used for a manual installation of Windows. (See Chapter 6)
- To update the BIOS.
  Use this function to update the system BIOS or firmware of the server. (See Chapter 6)
- To update the Windows System*
  "Update Express5800 system" in Windows Autorun Menu (Windows-based NEC EXPRESSBUILDER feature) updates the several resources of Microsoft Windows Server 2003. (See Chapter 6)
- To install the utilities.
  NEC EXPRESSBUILDER DVD includes some management software for Windows (NEC ESMPRO, NEC DianaScope and so on) . You can install the applications for Windows from Windows Autorun Menu. (See Chapter 6.)
- To read the online documents*
  You can refer to the online documents from Windows Autorun Menu. (See Chapter 6.)

  * These functions are available under the Windows system.

NOTE: Some features among those listed above can be used from the remote computer via cross cable (COM), or LAN. See Chapter 6 for details.

NEC ESMPRO

The NEC ESMPRO is server management software that runs on the OS. The NEC ESMPRO includes the NEC ESMPRO Manager for the server monitoring terminal and the NEC ESMPRO Agent for the server.

> **NOTE:** For details of major functions of the NEC ESMPRO, system configuration and setups with the NEC ESMPRO, see Chapter 6. Available functions of the NEC ESMPRO depend on the OS you install. Ask your service representative for details.

Maintenance Tools

The Maintenance Tools is used for maintenance and fault analysis of the server. This tool is usually used by the service representative.

See Chapter 8 for details.

SYSTEM DIAGNOSTIC UTILITY

The system diagnostic utility contained in the NEC EXPRESSBUILDER is useful to detect hardware failures. See Chapter 7 for details.

NEC DianaScope

The NEC DianaScope is a software for the remote management of the server. The NEC DianaScope can control the managed server even if OS is not running on the managed server.

See Chapter 6 and online document in the NEC EXPRESSBUILDER.

USING YOUR SERVER

This section describes basic operations of the server including how to use devices such as the optical disk drive. See Appendix B for notes on using the disc and accessories including the keyboard and the mouse.

Front Bezel

Remove the front bezel to power on/off the server, to access the optical disk drive and to install/remove hard disk drives to the 3.5-inch disk bays.

IMPORTANT:

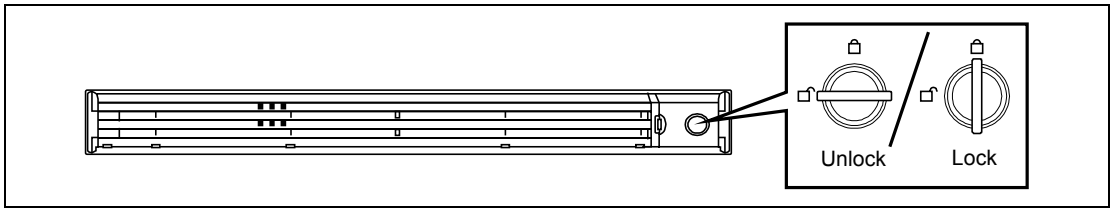
- To open the front door, you must unlock the door with the provided security key.
- Pay attention not to press the POWER switch when you install or remove the front bezel.

Installing or Removing the Front Bezel

When turning the power of the server on/off, accessing to the optical disk drive, or installing or removing a hard disk drive on or from the 3.5-inch disk bay, first remove the front bezel.

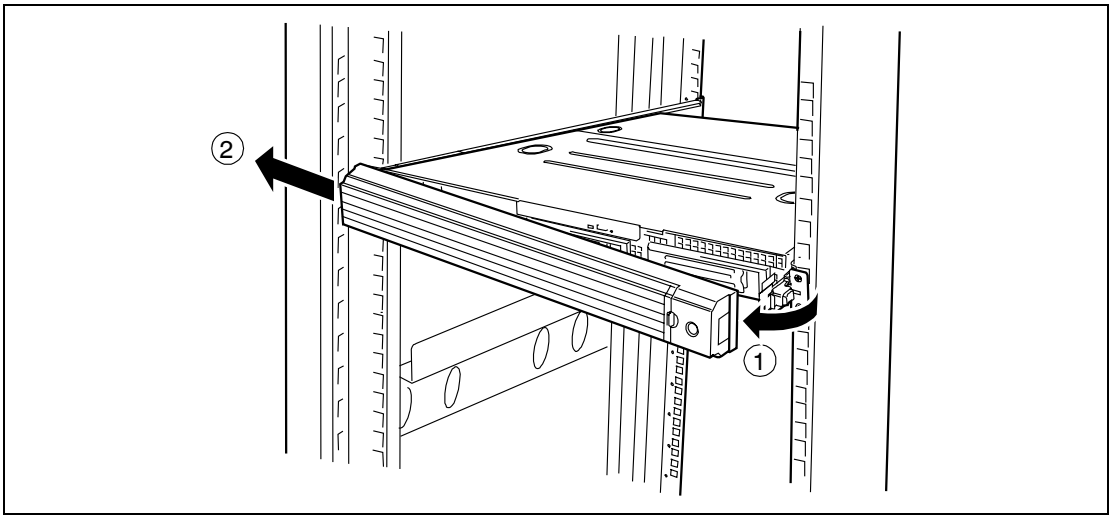
IMPORTANT: The front bezel can be opened only when you unlock it by using the attached security key.

1. Insert the attached security key into the key slot and turn the key to the front bezel side with it pressed lightly to release the lock.

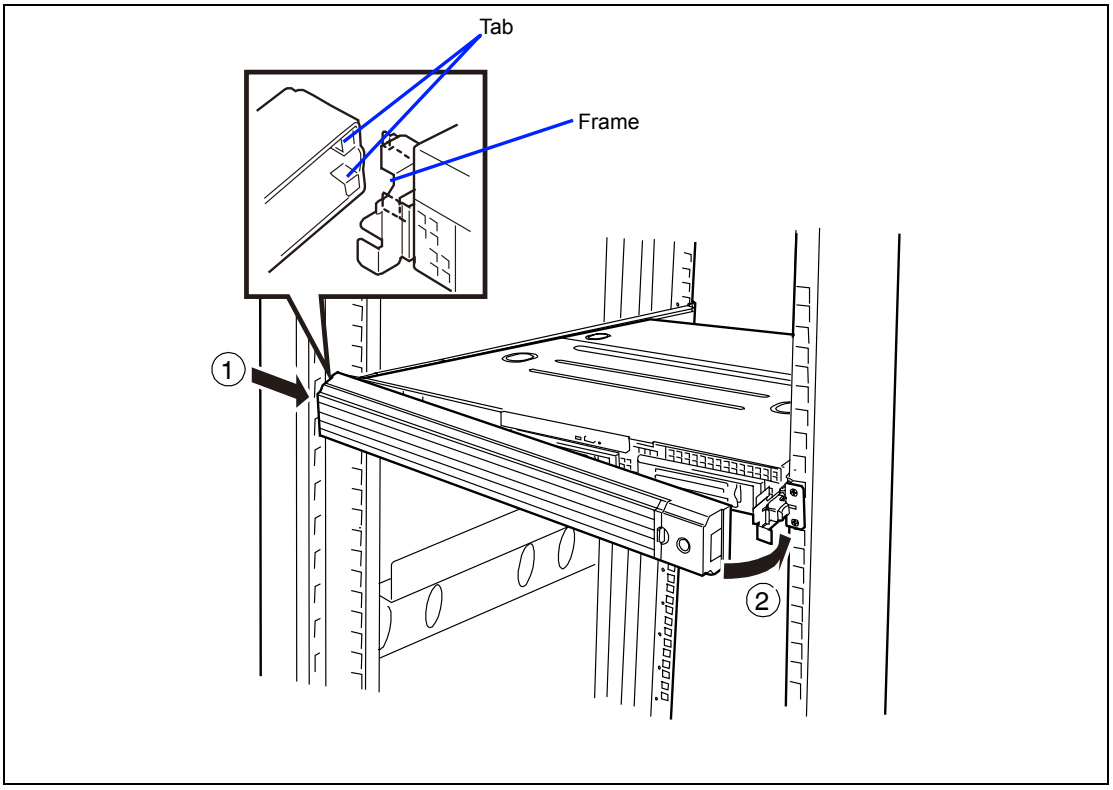


2. Hold the right end of the front bezel lightly to pull it toward you.

3. Slide the front bezel to the left a little to remove the tab from the frame and then remove the front bezel from the server.



To install the front bezel, latch the tab at the left side of the front bezel on the server frame. After the installation, lock the front bezel by using the key for security.



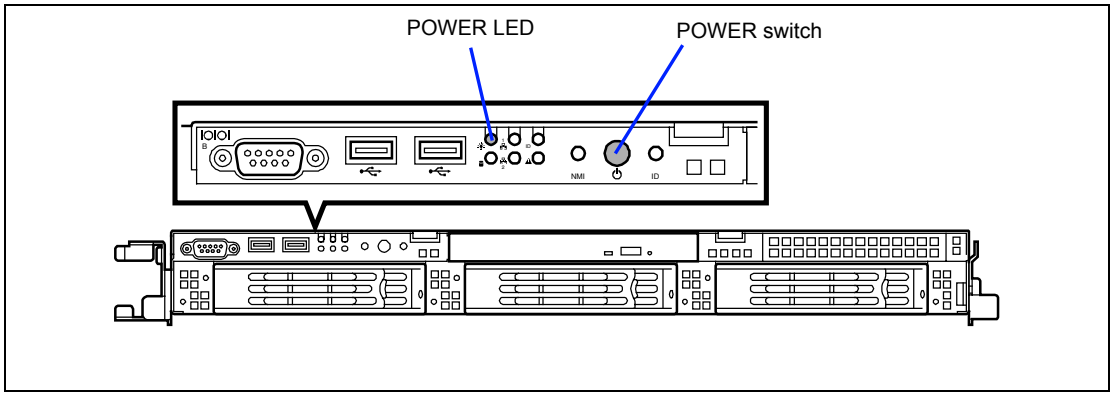
POWER Switch

Use the POWER switch to turn on/off the server.

Power On

Press the POWER switch on the front of the computer chassis.

The POWER LED lights in green.



IMPORTANT:

- If the power cord is connected to a power control device such as a UPS (Uninterruptive Power Supply), make sure that the power control device is powered.
- If the power cord is connected to the server, an initial diagnosis of the hardware starts. The POWER switch does not work while in diagnosis. Wait for about 30 seconds, then press the POWER switch.
- Always allow POST to complete before powering down your system.

POST

POST (Power On Self-Test) is the self-diagnostic program stored in the system memory.

When you power on the server, the system automatically runs POST to check the mother board, ECC memory module, CPU module, keyboard, and mouse. POST also displays messages of the BIOS setup utility, such as the start-up message, while in progress.

With the factory setup of the server, the NEC logo appears on the display unit while POST is in progress. (To display the POST check results, press **Esc**.)

> **NOTE:** You can set the POST check results to appear on the display unit without pressing **Esc**. To do so, select "Enabled" for "Boot-time Diagnostic Screen" under the Advanced menu of the BIOS SETUP utility.

The POST check results should be checked in the following cases.

- When the server is used for the first time.
- When the server appears to fail.
- When the server beeps for many times between power-on and OS start-up.
- When an error message appears on the display unit.

POST Execution Flow

The following describes the progress of POST in the chronological order.

IMPORTANT:

- Do not make key entries or perform mouse operations while POST is in progress.
- Some system configurations may display the message "Press Any Key" to prompt a key entry. This message is driven by BIOS of an installed optional board. Make sure to read the manual that comes with the optional board before any key entry.
- Powering on the server, after you installed or removed an optional PCI board or moved it to another slot, may display the message that indicates incorrect board configuration and suspend POST. In such a case, press **F1** to continue POST. Board configuration can be made using the utility described later.

1. After a few seconds from power-on, POST starts checking the memory. The count message of the basic and expansion memory appears at top left on the display unit screen. The memory check may takes a few minutes to complete depending on the memory size of the server. Also, it may take approximately one minute for the screen display to appear after rebooting the server.
2. Some messages appear upon completion of the memory check. These messages appear to indicate that the system has detected the CPU, baseboard management controller, keyboard, and mouse.
3. After a few seconds, POST displays the following message prompting you to launch the BIOS SETUP utility stored in the system memory of the server. This message appears at bottom left on the screen.

   ```
   Press <F2> to enter SETUP, <F12> to Network
   ```

   Launch the BIOS setup utility when you need to change the settings to meet the requirements for the server. As long as the above message is not displayed with an error message, you don't have to launch the utility. (Ignore the message. POST will automatically proceed.)

   To launch the SETUP utility, press **F2** while the above message is displayed. See Chapter 4 for setup and parameters.

   The server automatically restarts POST all over again when you exit the SETUP utility.

   The message "<F12> to Network" prompts you network booting (PXE boot). If you press **F12**, the POST searches for boot device on network.

4. <When 3.5-inch disk model server contains 3.5-inch SATA hard disk drive>

If your server uses Onboard RAID Controller, the following message is displayed to prompt you to run RAID utility.

```
Press <Ctrl><M> to Run LSI SoftwareRAID Configuration Utility
```

Press **Ctrl** + **M** to run the utility. For detail explanation, see Chapter 4 for detail.

IMPORTANT: The LSI Software RAID Configuration Utility is used to manage the data stored in hard disk drive, or for maintenance. See Chapter 4 for detail. This feature is unavailable for 2.5-inch disk model.

5. If the POST detects the optional add-in card, it display the message prompting you to launch the add-in card BIOS configuration utility. (Ignore the message. POST will automatically proceed a few seconds later.)

Refer to the manual that comes with the optional add-in card for detail.

6. If you set a password using the BIOS setup utility, SETUP, the password entry screen appears upon successful completion of POST.

Up to three password entries will be accepted. Three incorrect password entries disable the server to boot. In such a case, turn off the power and wait about ten seconds before turning on to boot the server.

IMPORTANT: Do not set a password before installing an OS.

7. The OS starts when POST completes.

POST Error Messages

When POST detects an error, it displays an error message on the display unit screen. See Chapter 8 for POST error codes.

> **IMPORTANT:** Take a note on the messages displayed before consulting with your service representative. Alarm messages are useful information for maintenance.

Power Off

Follow the procedure below to power off the server. If the power cord of the server is connected to a UPS, refer to the manual that comes with the UPS or the manual for the application that controls the UPS.

> **IMPORTANT:** Always allow POST to complete before turning off the server.

1. Shutdown the OS.
2. Press the POWER switch on the front of the server.
   The POWER LED goes off.
3. Power off peripheral devices.

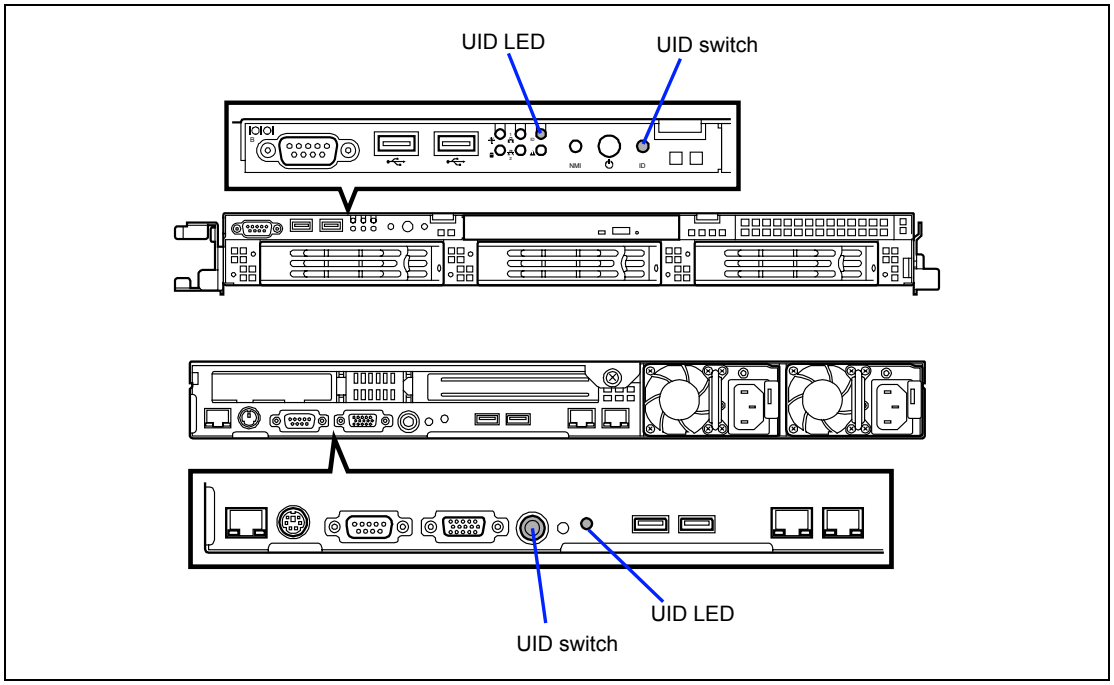
> **NOTE:** The standby feature of Windows Server is not available. Do not select "Standby" in Windows shutdown menu.

Identification of Servers ~ UID Switch ~

An "UID (Unit ID) LED" is provided on the front panel and rear panel. If more than one server is mounted in a single rack, the LED identifies the server you are going to maintain.

The UID LED goes on when the UID (Unit ID) switch on the front panel is pressed. It goes off when the switch is pressed again.

Maintenance from the rear of the rack has to be carried out in a dark, narrow space. The interface cable of a server or power supply unit in normal state may be disconnected by accident in this situation. To prevent this problem, you should start maintenance after confirming the target server by using the UID switch.



Optical Disk Drive

The server is provided with the optical disk drive on its front to read data from a disc.

⚠ CAUTION

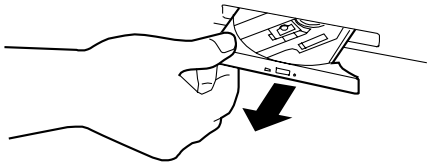
Observe the following instructions to use the server safely. Failure to follow these instructions may cause a fire, personal injury, or property damage. See pages 1-3 to 1-8 for details.

- Do not leave the tray ejected from the optical disk drive.

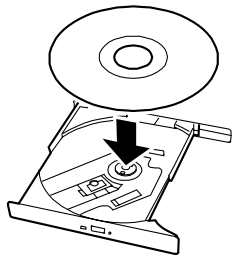
Set a disc on the optical disk drive in the following procedure.

1. Confirm that the power of the server is on (with the POWER LED being lit) before setting the disc on the optical disk drive.
2. Press the Eject button on the front of the optical disk drive.

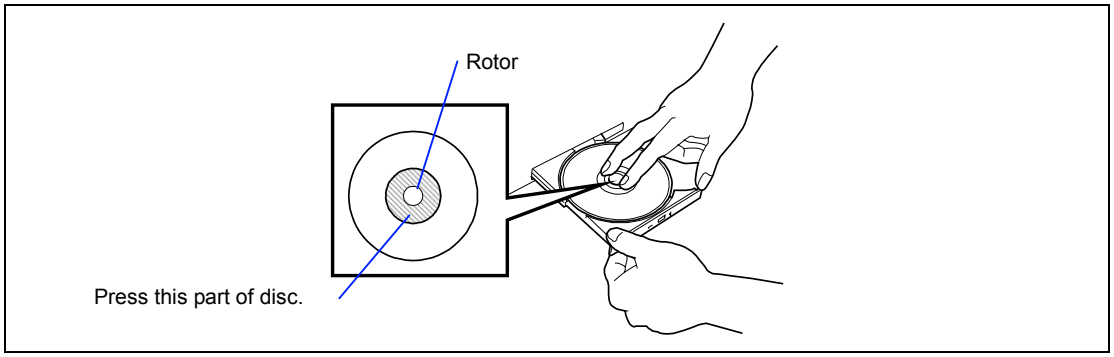
   The tray comes out a little.
3. Hold the tray lightly and pull it out toward you until the tray stops.



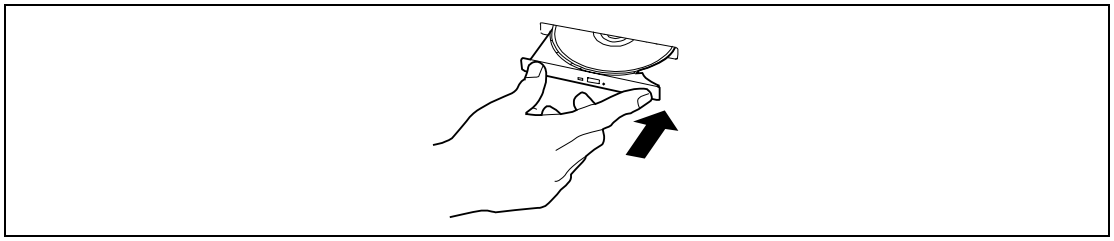
4. Put the disc on the tray carefully and securely with the character printed surface facing upward.



5. As shown in the figure below, hold the tray with a hand and press the disc with fingers of another hand to make the hole of the disc fit to the rotor at the center of the tray.

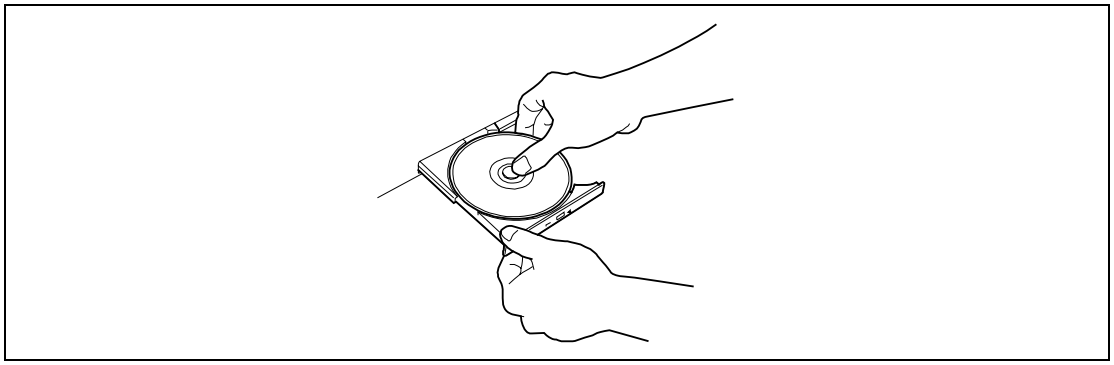


6. Push the front of the tray lightly to retract it into the drive.



IMPORTANT: If a noisy sound in driving the optical disk drive occurs after setting a disc, set it again correctly.

To take out the disc from the optical disk drive, press the Eject button in the similar way in setting the disc to make the tray go out.

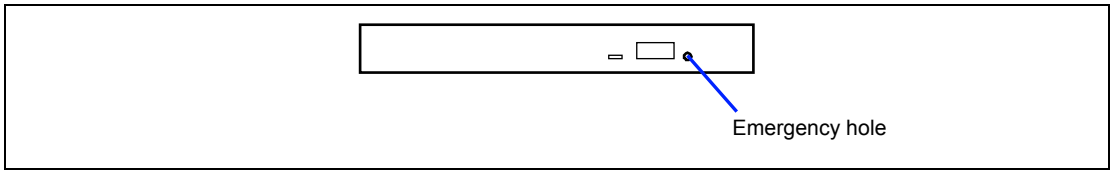


If the access LED is lit, the disc is being accessed. Confirm that the access LED is not lit before pressing the Eject button.

As shown in the figure below, hold the tray with a hand and take the end of the disc lightly by the fingers of another hand with the suppression of the rotor at the center of the tray to remove the disc from the tray.

After taking out the disc, return the tray into the drive.

When you fail to eject the tray with the Eject button and take out the disc from the server, follow the procedure below.



1. Press the POWER switch to power off the server. (The POWER LED goes off.)
2. Insert a metal pin of approximately 1.2 mm in diameter and 100 mm in length (a straightened large paper clip will make a substitute) into the emergency hole on the right front of the optical disk drive and gently push it in until the tray is ejected.

IMPORTANT:

- Do not use a toothpick or plastic stick that is easy to break.
- If the above procedure does not let you take out the disc, contact your service representative.

3. Hold the tray and pull it out.
4. Take out the disc.
5. Push the tray back into position.

NOTE: Use of the Disc

Keep the following notes in mind to use the disc for the server:

- For the disk which does not conform to the CD standard, the playback of such a disk with the CD drive is not guaranteed.
- Do not drop the disc.
- Do not place anything on the disc or bend the disc.
- Do not attach any label onto the disc.
- Do not touch the signal side (nothing is printed on this side) with your hand.
- Place the disc with its printed side upward and gently put it on the tray.
- Do not scratch the disc or write anything directly on it with a pencil or ball-point pen.
- Keep the disc away from cigarette smoke.
- Do not leave the disc in a high-temperature place (e.g., place exposed to direct sunlight or close to a heater).
- When dust or fingerprints are attached on the disc, wipe the disc from its center to edge with a dry soft cloth slowly and gently.
- Use the CD cleaner to clean the disc. Do not use record spray/cleaner, benzene, or thinner.
- Keep the disc in a disc case when not in use.
- If the disc emits large noise in the optical disk drive, remove the disc and insert it back again.

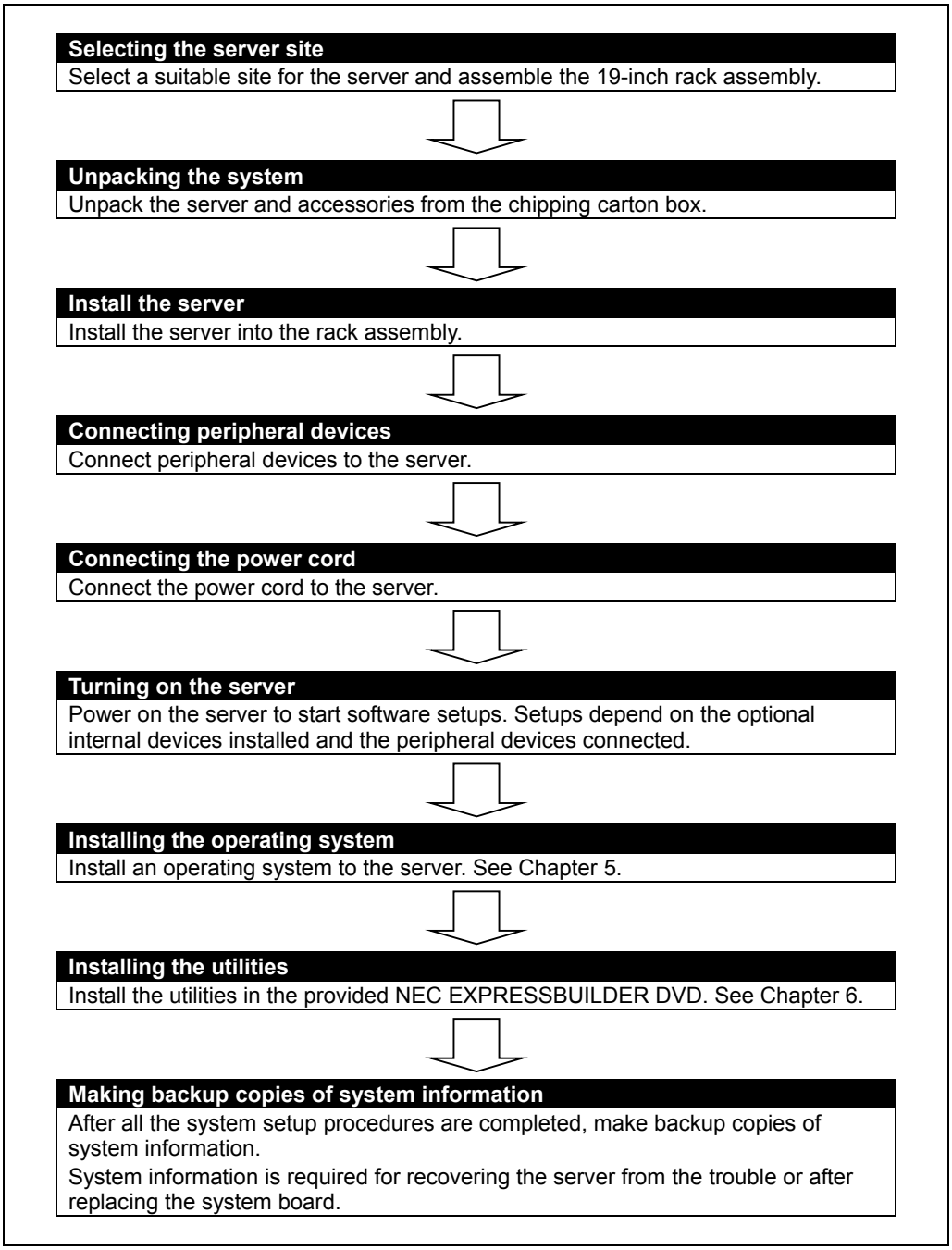
Chapter 3

Setting Up Your Server

This chapter describes how to set up the server appropriate for your system, on a step-by-step basis.

SETUP FLOW

Follow the flowchart below to set up the server.


Selecting the server site
Select a suitable site for the server and assemble the 19-inch rack assembly.
Unpacking the system
Unpack the server and accessories from the chipping carton box.
Install the server
Install the server into the rack assembly.
Connecting peripheral devices
Connect peripheral devices to the server.
Connecting the power cord
Connect the power cord to the server.
Turning on the server
Power on the server to start software setups. Setups depend on the optional internal devices installed and the peripheral devices connected.
Installing the operating system
Install an operating system to the server. See Chapter 5.
Installing the utilities
Install the utilities in the provided NEC EXPRESSBUILDER DVD. See Chapter 6.
Making backup copies of system information
After all the system setup procedures are completed, make backup copies of system information.
System information is required for recovering the server from the trouble or after replacing the system board.

SELECTING SERVER SITE

To use the server, install it on a standard EIA 19-inch rack assembly.

Refer to the documentation attached to the rack or contact your service representative for the installation of the server on the rack.

⚠ WARNING

Observe the following instructions to use the server safely. Failure to follow these instructions may result in death or serious personal injury. See pages 1-3 to 1-8 for details.

- Do not use the server in any unapproved place.
- Do not connect the ground line to a gas pipe.

⚠ CAUTION

Observe the following instructions to use the server safely. Failure to follow these instructions may cause a fire, personal injury, or property damage. See pages 1-3 to 1-8 for details.

- Do not carry or install the server only by a single person.
- Do not install the server where the load may be concentrated on a specific point.
- Do not install any component on the server only by a single person.
- Insert the hinge pins completely.
- Do not pull out a device from the rack if the rack is unstable.
- Do not leave more than one device being pulled out from the rack.
- Do not provide the wiring exceeding the rating power.
- Do not use the server in a place where corrosive gases exist.

Do not install the rack in the places listed below. Installing the rack or mounting the server on the rack in such a place may cause some malfunction to occur.

- Narrow space from which devices cannot be pulled out from the rack completely
- Place that cannot bear the total weights of the rack and devices mounted on the rack
- Place where stabilizers cannot be installed or where the rack can be installed only after the practice of proper earthquake-resistant construction
- Place of uneven or slanting floor
- Place of drastic temperature change (near a heater, air conditioner, or refrigerator)
- Place where intense vibration may be generated
- Place where corrosive gases (sulfur dioxide, hydrogen sulfide, nitrogen dioxide, chlorine, ammonia, ozone, etc) exist.
  Place where the air (or dust) includes components accelerating corrosion (ex. sulfur, sodium chloride) or conductive metals.
  Place where chemicals may be accidentally sprayed over
- Place where a carpet not subject to anti-static process is laid.
- Place where some objects may be fallen on the rack
- Place near a device generating intense magnetic field (such as a TV, radio, broadcast/communication antenna, power transmission wire, and electromagnetic crane) is placed (If unavoidable, contact your service representative to request proper shield construction.)
- Place where the power cord of the server must be connected to an AC outlet that shares the outlet of another device with large power consumption.
- Place near equipment that generates power noise (e.g., contact spark at power-on/power-off of commercial power supply through a relay). If you must install the server close to such equipment, request your service representative for separate power cabling or noise filter installation.

IMPORTANT: Increase in temperature within rack and air flow

If more than one server are installed on the rack or the ventilation within the rack is not enough, the temperature in the rack may be raised by the heat generated from the units to be higher than the operation temperature of the server (10 to 35°C).

It causes the server to operate improperly. Review the air flow within the rack or in the room and take sufficient measures so that the temperature within the rack does not exceed the warranted temperature range during the system operation.

The server takes in the air from the front and exhausts it to the rear.

INSTALLING THE SERVER

This subsection provides the instructions for installing the server into a rack cabinet. (This subsection also describes the removal procedures.)

⚠ WARNING

Observe the following instructions to use the server safely. Failure to follow these instructions may result in death or serious personal injury. See pages 1-3 to 1-12 for details.

- Do not use any rack which does not conform to the relevant standard.
- Always use the server in the specified place.

⚠ CAUTION

Observe the following instructions to use the server safely. Failure to follow these instructions may cause a fire, personal injury, or property damage. See pages 1-3 to 1-12 for details.

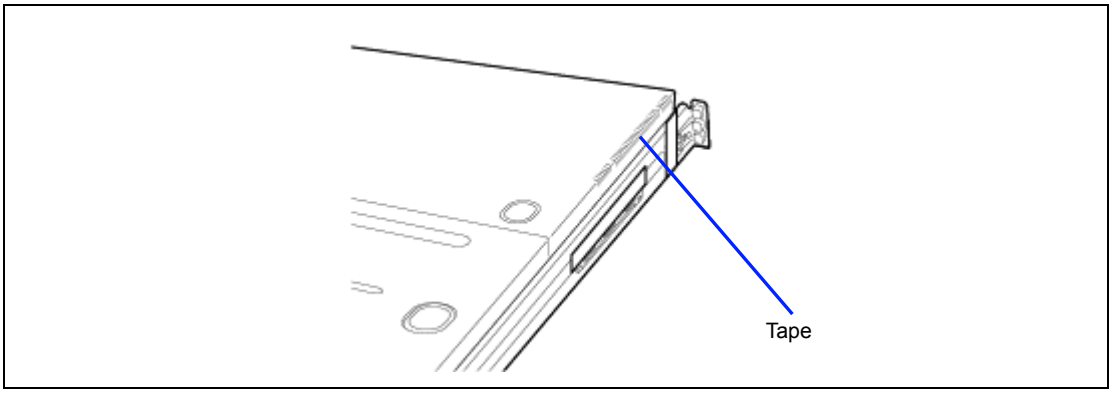
- Do not install/remove the server in/from the rack only by a single person.
- Do not install the server on the rack leaving the cover removed.
- Do not pinch your finger with mechanical components.
- Do not apply any load on the server being pulled out from the rack.

Installation

This server can be installed in either the NEC rack or a third vendor's rack. Take the following steps to install the server in the rack.

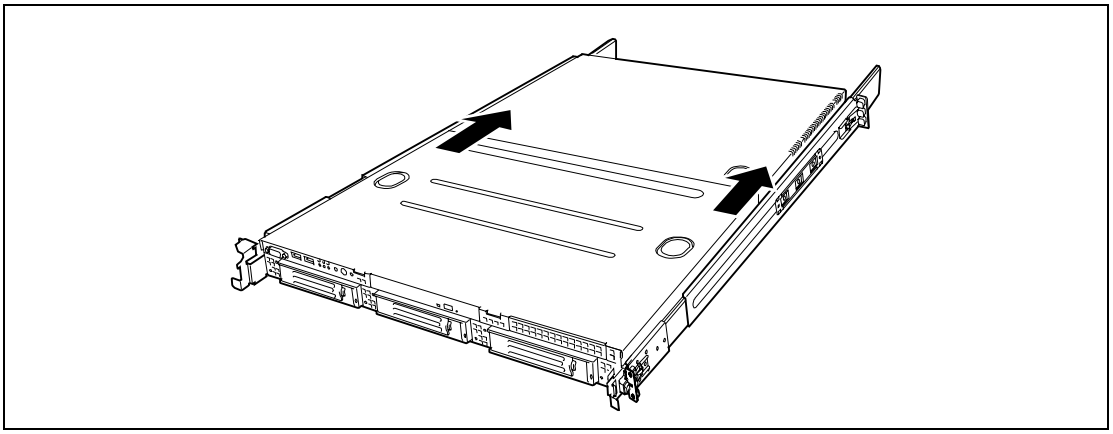
- Preparation for installation

  When shipped from factory, the left and right slide rails are fixed with tapes at the front and side faces to prevent from falling off during transportation. Peel off the tape before you install the server in the rack.

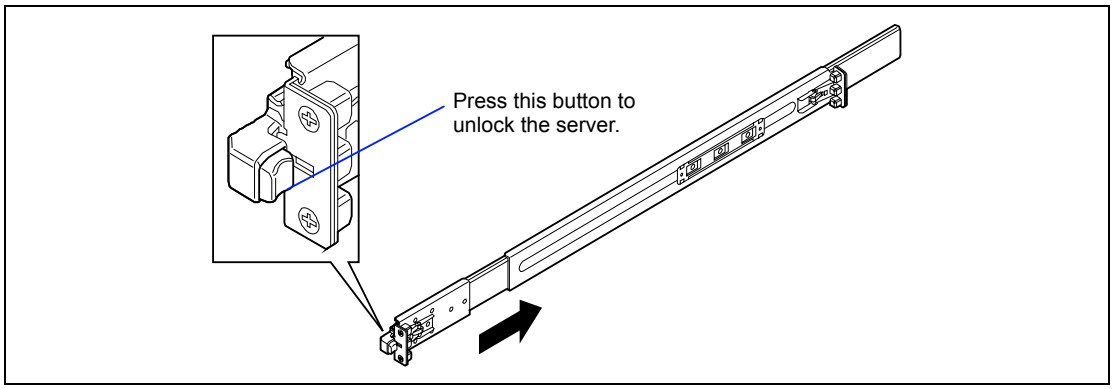


Removing rail assemblies

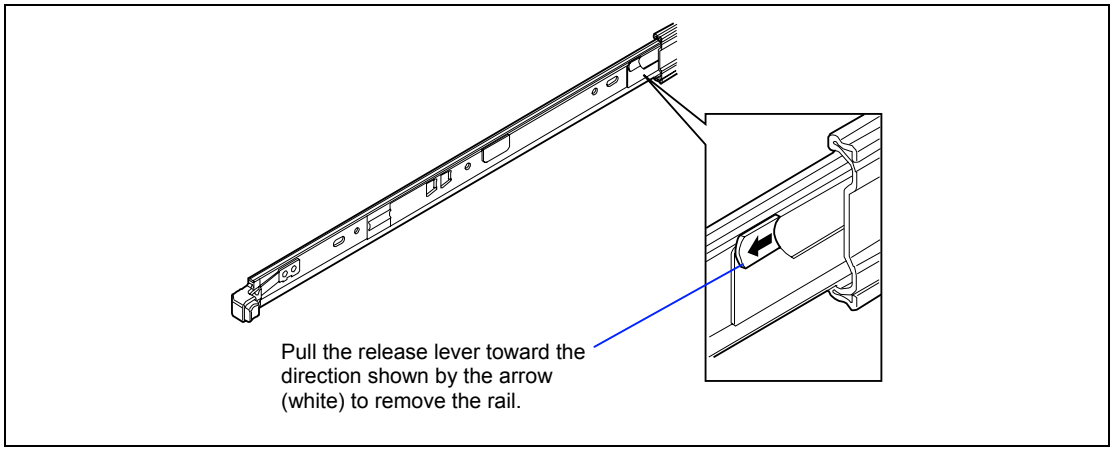
1. Remove the sliding rails from left and right sides of the server.



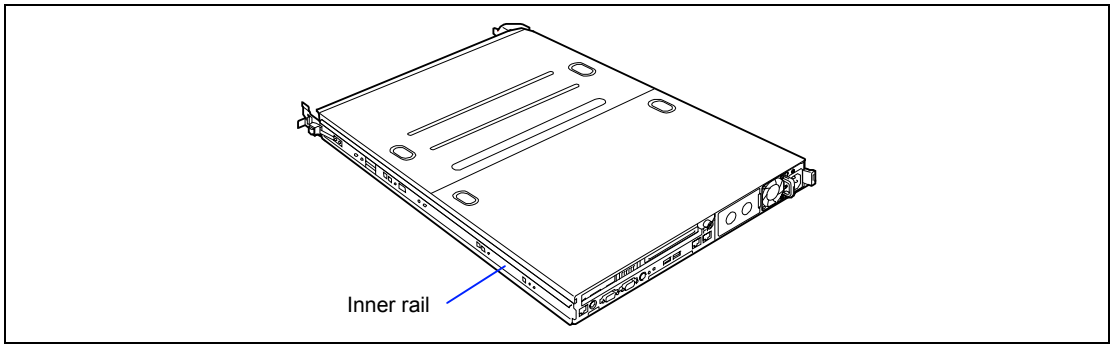
2. While pushing the unlock button on the front of the server, hold the rails and slowly move them toward the rear of the server.



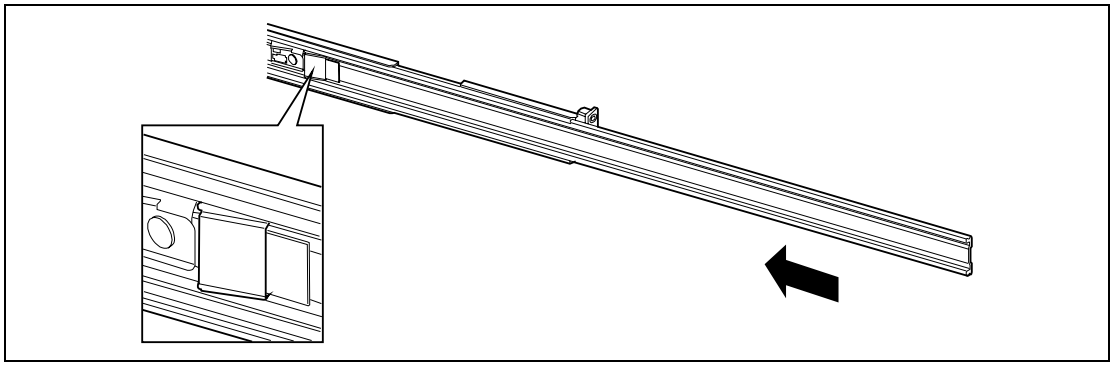
3. After a while, the rails are locked with clicking sound. Pull the release levers on the left and right sides of the server toward direction indicated by an arrow (white) in the figure, and remove them from the server while unlocking it.



4. Only the inner rails remain screwed to the server when the rail assemblies have been removed.



5. While pushing the levers, move the removed rail assemblies toward the direction indicated by an arrow in the figure, to restore the original position.



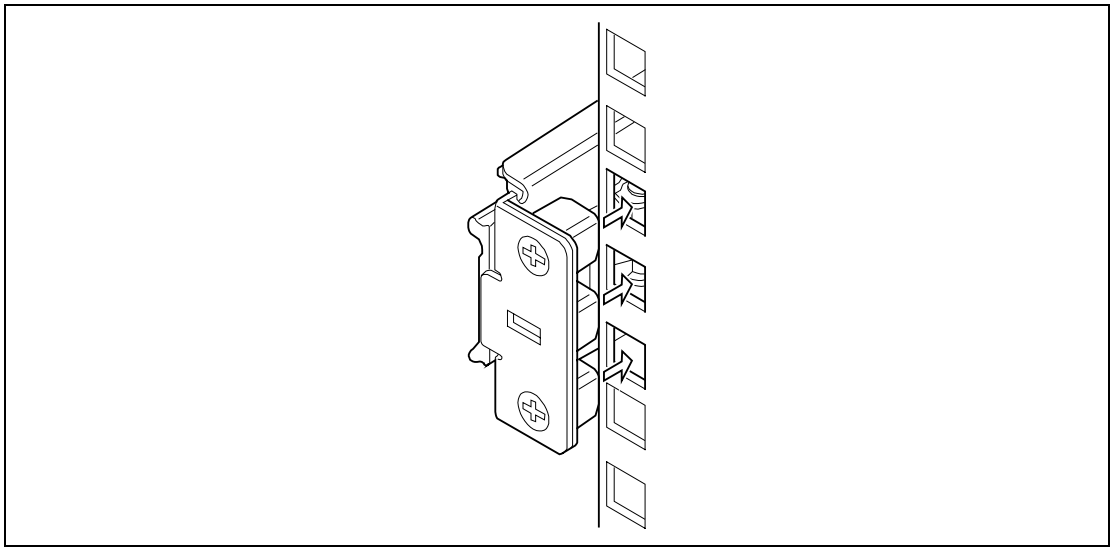
IMPORTANT:

- The removed rail assemblies are to be installed on the inner rails later.
- Be very careful not to get your finger caught in the levers or rails.

Installing rail assemblies

1. Insert the square projection of the rail assembly into the angle hole on the 19-inch rack until it is locked with clicking sound.

The figure below shows the right side (front) of the rack. Install the rail assemblies to the right side (rear), and left side (front and rear) of the rack in the same procedure.



Make sure that the rail assembly is installed at the same level as the other slide rail assembly already installed.

NOTES:

- There may be some backlashes in the front and rear, however, it is not a deficiency.
- Make sure that the rail assembly is surely locked to the rack.

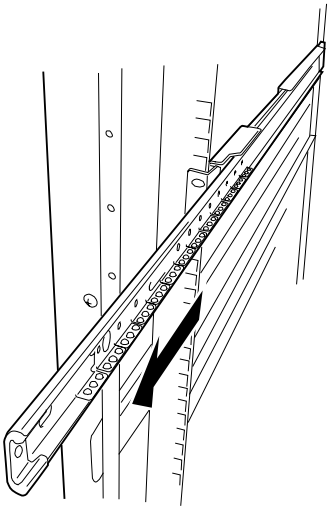
Installing the Server

⚠ CAUTION

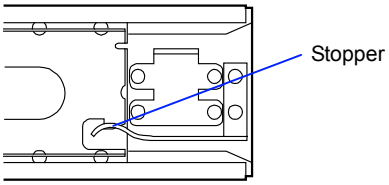
Observe the following instructions to use the server safely. Failure to follow these instructions may cause a fire, personal injury, or property damage. See pages 1-3 to 1-12 for details.

- Do not lift the server only by a single person.
- Do not pinch your finger with mechanical components.

1. Pull out the sliding rails of the right and left rail assemblies until they are locked.

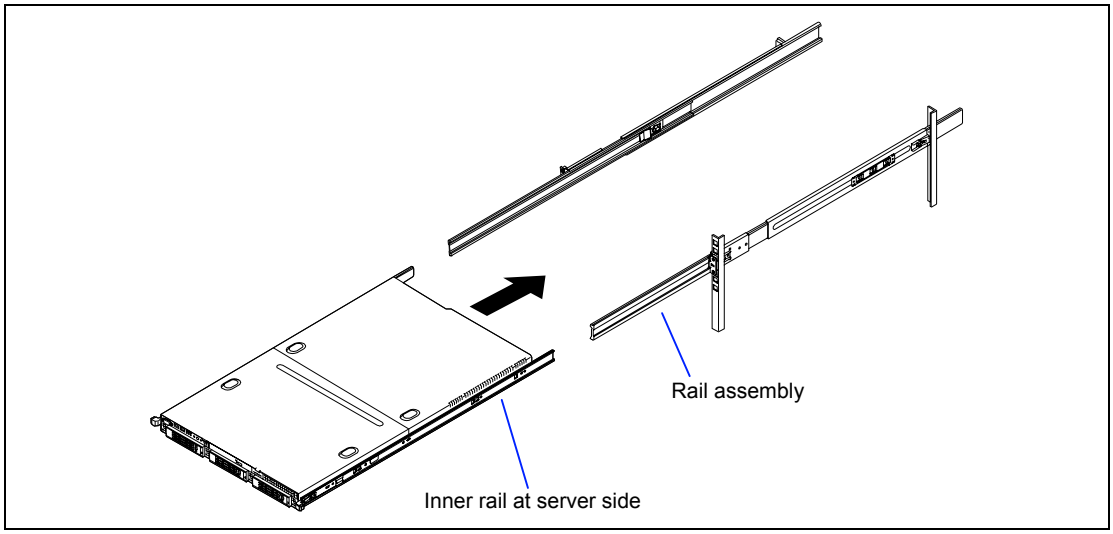


NOTE: Make sure that the sliding rails are surely locked by the stopper.



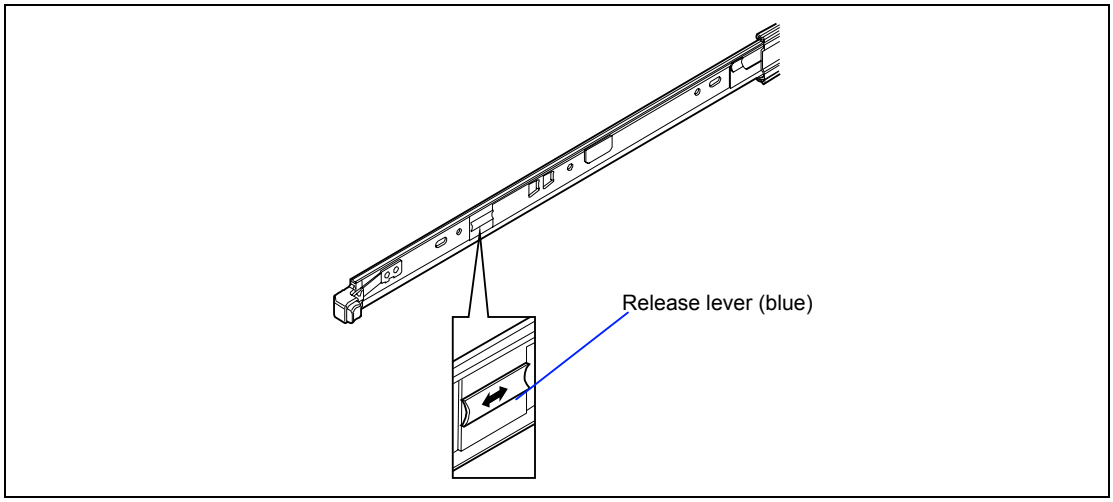
2. At least two persons are required to install the server. Securely hold the server and install it in the rack.

Firmly fit the inner rails on the sides of the server into the rail assemblies that are installed on the rack, and then slowly push the server into the rack.



3. If the server is locked on its way into the rack, slowly push it in while pressing the release levers (blue) on the right and left sides of the server.

When the server is completely pushed into the rack, the server is locked.



IMPORTANT:

- Be very careful not to get your finger caught in the levers or rails.
- Insert both sides of inner rails straight into the rack.
- Hold the thumbscrews on both sides of the server, and install the server carefully while making sure the installation position.

NOTES:

- At the first installation, you may feel strong friction in pushing because the mechanical components cannot be completely engaged with each other. Push the server intensely.
- If the installation is incomplete, either of rails may not go further on its way. In such a case, pull out the server completely until it is locked. Then, push the server in while unlocking the right and left sides of it.

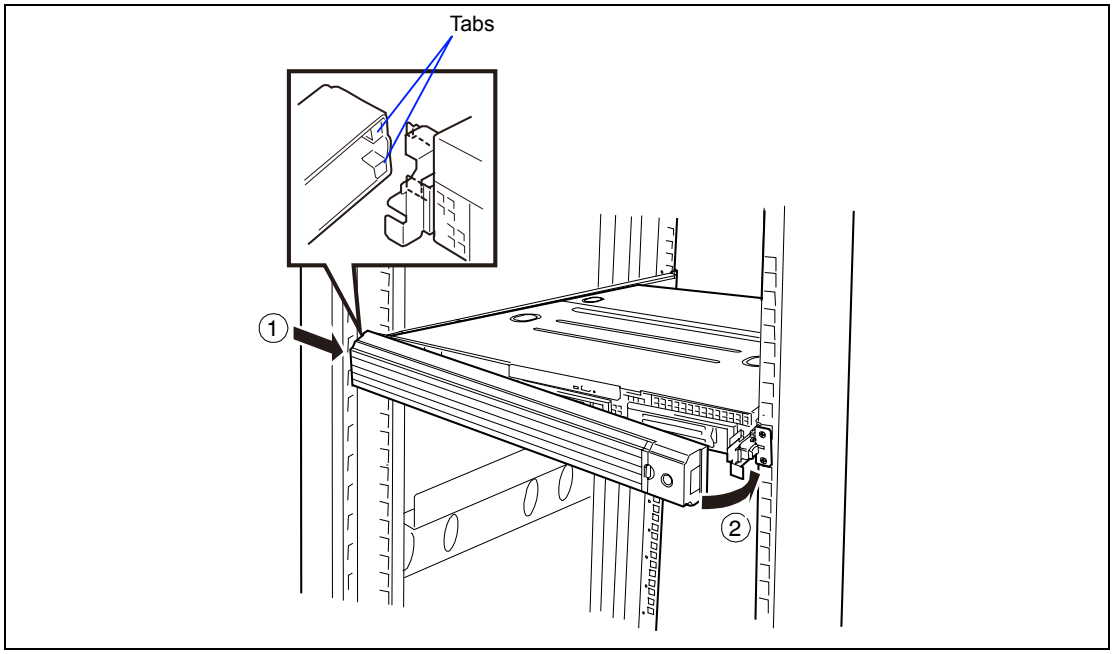
4. Make sure that the sliding rails move smoothly by pulling the server out of the rack and pushing it in several times.

NOTES:

- To install the server in the location adjacent to the other device, pay attention to interference. If the installing server disturbs the other devices already been installed, adjust the position, and install the rail assembly again.
- Make sure that the sliding rails move smoothly. If the sliding rails are stuck to the rack frame and do not come out, reinstall them.

Installing the front bezel

1. Install the front bezel so that the left tab on the front bezel engages with the chassis frame.



Removal

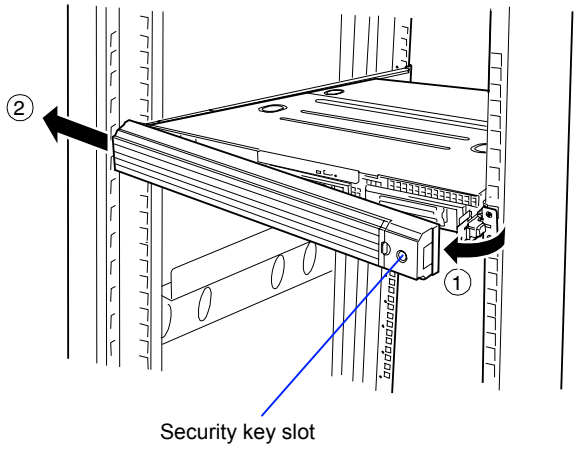
Remove the server from the rack in the following procedure.

⚠ CAUTION

Observe the following instructions to use the server safely. Failure to follow these instructions may cause a fire, personal injury, or property damage. See pages 1-3 to 1-12 for details.

- Do not install/remove the server in/from the rack only by a single person.
- Do not pinch your finger with mechanical components.
- Do not apply any load on the server being pulled out from the rack.
- Do not pull out a device from the rack if the rack is unstable.
- Do not leave more than one device being pulled out from the rack.
- Do not pull out the server from the rack while it is operating.

1. Make sure that the server is off-powered, and disconnect the power cords and all the interface cables from the server.
2. Unlock the front bezel with the security key.

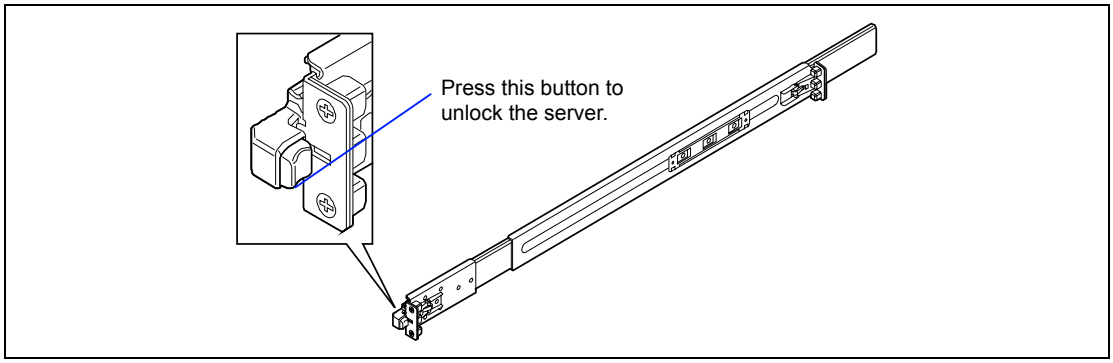


3. <This step is required only when the optional cable arm is mounted.>

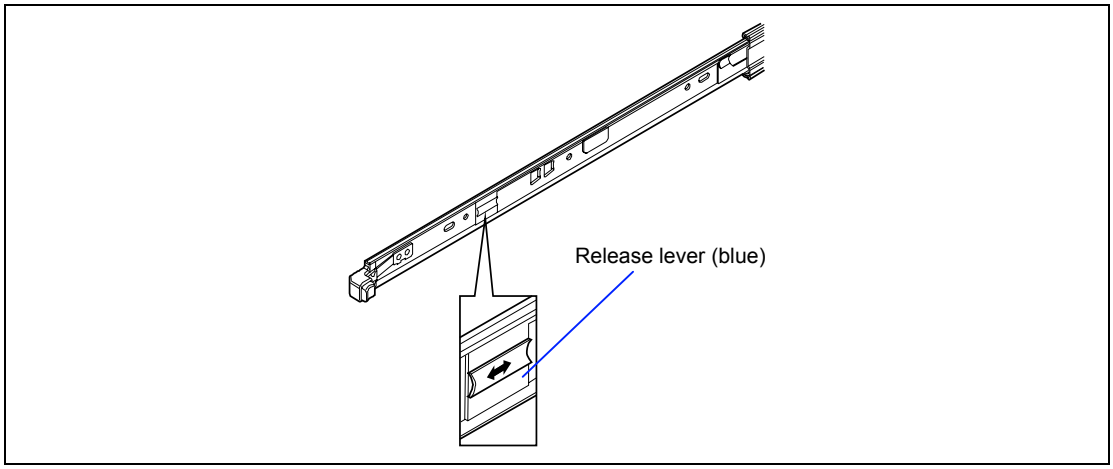
   Remove the cable arm from the server.

4. While pushing the left and the right unlock buttons on the front of the server, pull out the server from the rack slowly and carefully.

   The server clicks to be latched.



5. While pushing the right and left release levers (blue) forward or rearward to unlock, slowly pull out the server from the rack.



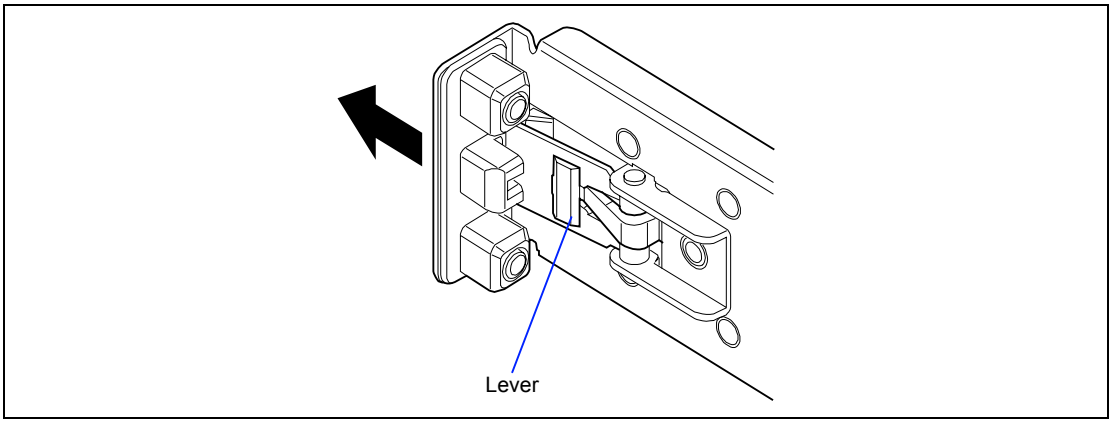
IMPORTANT: Do not apply any load on the server pulled out from the rack. Doing so may cause personal injury if the server drops.

6. Firmly hold the server, and take it out from the rack.

IMPORTANT:

- Pull out the server slowly holding the bottom of the server by at least two persons.
- Do not apply any load on the server pulled out from the rack. Doing so may cause personal injury if the server drops.
- Be very careful not to get your finger caught in the levers or rails.

7. To remove the rail assembly, pull out the rail toward you while pushing the lever.



CONNECTING PERIPHERAL DEVICES

Connect peripheral devices to the server. The server is provided with connectors for wide variety of peripheral devices on its front and rear. The figure on the next page illustrates available peripheral devices for the server in the standard configuration and locations of the connectors for the devices.

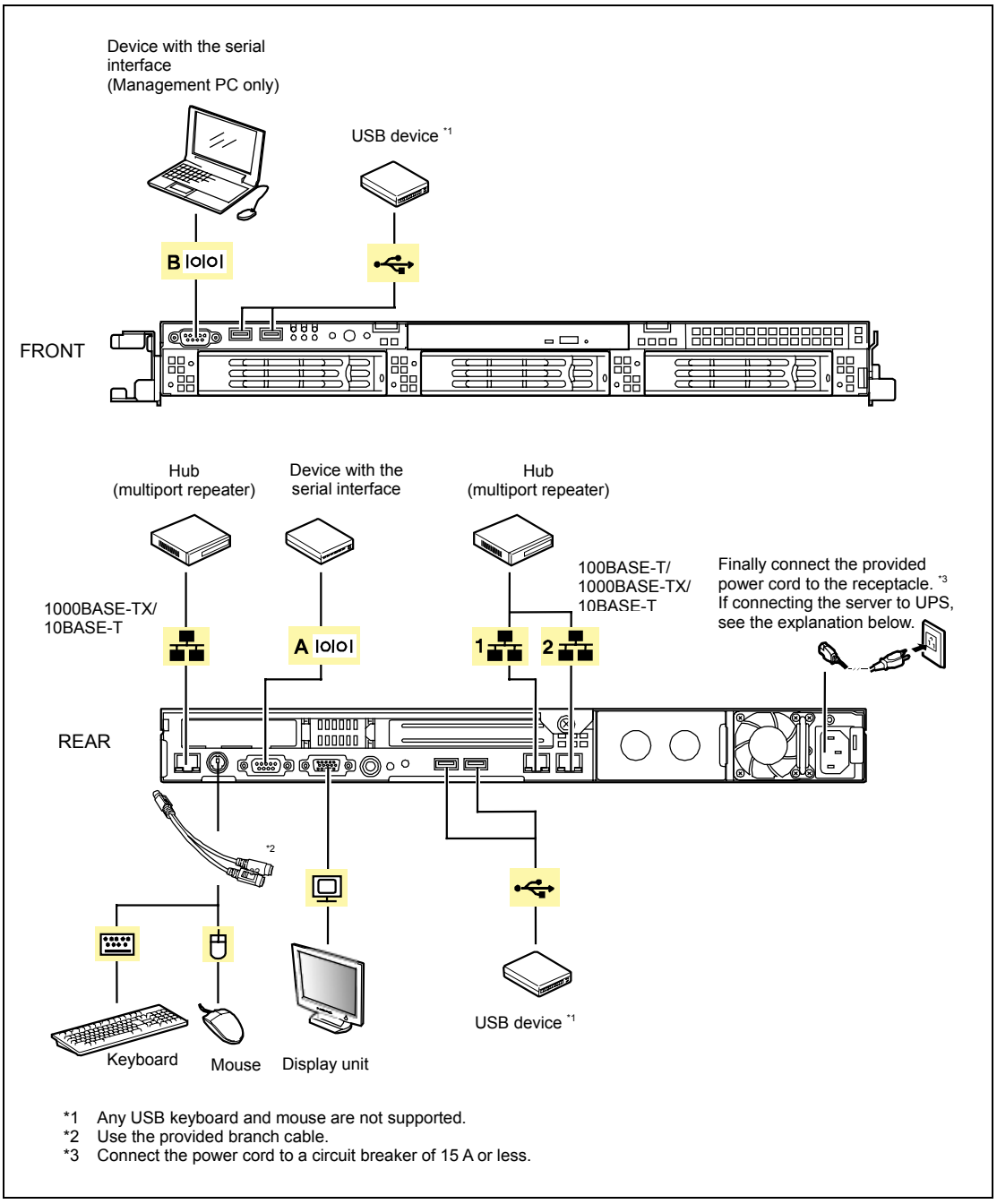
⚠ CAUTION

Observe the following instructions to use the server safely. Failure to follow these instructions may cause a fire, personal injury, or property damage. See pages 1-3 to 1-8 for details.

- Do not connect any interface cable with the power cord of the NEC Express Server plugged to a power source.
- Do not use any unauthorized interface cable.

IMPORTANT:

- Power off the server and a peripheral device before connection. Connecting a powered peripheral device to the powered server will cause malfunctions and failures.
- To connect a third-party peripheral device or interface cable to the server, consult with your service representative for availability of such a device or cable. Some third-party devices may not be used for the server.
- A leased line cannot be connected directly to the serial port connectors.
- Secure the power cord(s) and interface cables with a tie wrap.
- Form the cables in such a way that they will not come into contact with the door or the guide rails on the sides of the server.
- Do not apply any pressure to the plug of the power cord.



*1 Any USB keyboard and mouse are not supported.
*2 Use the provided branch cable.
*3 Connect the power cord to a circuit breaker of 15 A or less.

CONNECTING POWER CORD

Connect the provided power cord to the server.

⚠ WARNING

Observe the following instructions to use the server safely. Failure to follow these instructions may result in death or serious personal injury. See pages 1-3 to 1-8 for details.

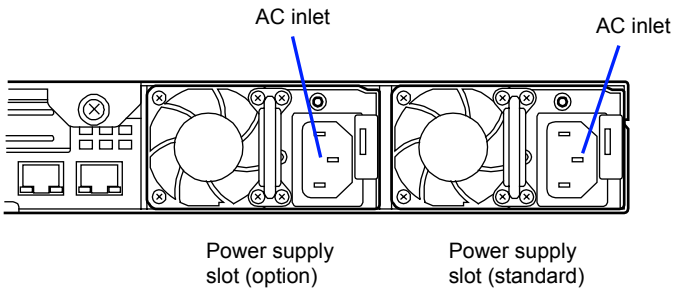
- Do not hold the power plug with a wet hand.
- Do not connect the ground wire to a gas pipe.

⚠ CAUTION

Observe the following instructions to use the server safely. Failure to follow these instructions may cause a fire, personal injury, or property damage. See pages 1-3 to 1-8 for details.

- Do not plug the power cord in to an improper power source.
- Do not connect the power cord to an outlet that has an illegal number of connections.
- Insert the power plug into the outlet as far as it goes.
- Use the authorized power cord only.

1. Plug the provided power cord into the power receptacle on the rear of the server.
2. Plug the other end of the power cord into the wall outlet.



IMPORTANT:

- Connect the power cord to a circuit breaker of 15A or less.
- Secure the power cord with a tie wrap.

To connect the power cord from the server to an uninterruptive power supply (UPS), use service outlets on the rear of the UPS. Refer to the manual that comes with the UPS.

When the power cord from the server to a UPS, change the BIOS setup of the server to link with power supply from the UPS.

To power on the server from the UPS (Uninterruptible Power Supply), select [Server] - [AC-LINK] - [Power On].

Change a parameter for "AC-LINK" under the Server menu of the BIOS SETUP utility. See Chapter 4 for details.

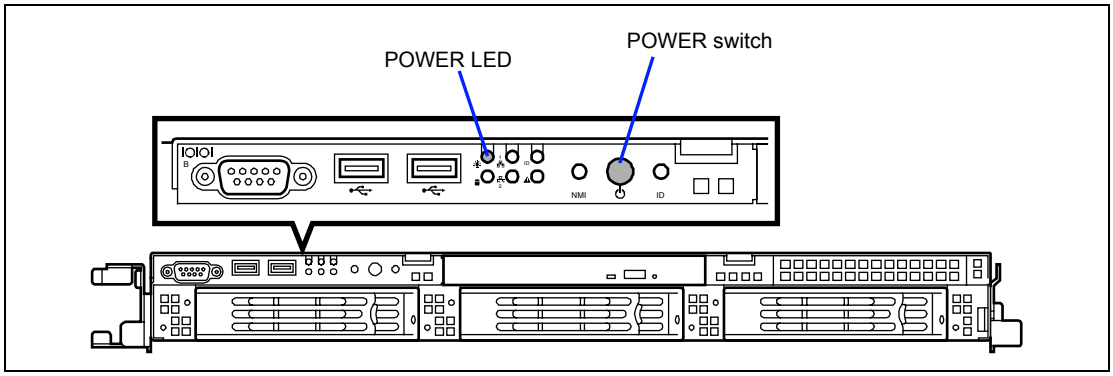
TURNING ON THE SERVER

Power on your system as follows.

1. Make sure all external devices, such as a video display, keyboard, and mouse (optional) have been connected, and the power cords are connected.
2. Power on the video display and any other external devices.

> **NOTE:** If the server power cord(s) is connected to a power control unit such as an UPS (Uninterruptible Power Supply), make sure that the power control unit is powered on.

3. Open the front bezel.
4. Press the POWER switch.
   The POWER LED on the front of the server comes on.



After a few seconds your system begins the internal Power-On Self Test (POST). POST automatically checks the system board, CPU module, memory, keyboard, and most installed peripheral devices.

> **IMPORTANT:**
>
> - Always allow POST to complete before powering down your system.
> - The server management logic on your system board monitors and logs system voltage changes. When powering down your system you may experience a 30-second delay from the time you press the push-button power on/off switch on the front panel and your system powering down. This is normal system operation and is required by the server management logic.

If you have problems powering on your system, see Chapter 8.

After you have successfully powered on your system, insert the NEC EXPRESSBUILDER DVD into the optical disk drive, reboot the system and follow the screen prompts to run NEC EXPRESSBUILDER.

INSTALLING OPERATING SYSTEM

See Chapter 5 for installing the Microsoft Windows Server 2003 operating systems.

To install the other operating system listed above, contact your service representative.

> **IMPORTANT:** Before installing the operating system, adjust the system date and time by using the BIOS setup utility "SETUP." See the next chapter for detail.

INSTALLING UTILITIES

Install the utilities that come with the server. See Chapter 6 for details.

MAKING BACKUP COPIES OF SYSTEM INFORMATION

The system information includes the current BIOS settings and any specific information for the server.

Save the information after completing the system setup.

Without the backup data, you will not be able to recover the information.

You can save the information by the following process.

1. Insert the NEC EXPRESSBUILDER DVD into the optical disk drive and reboot the system.
2. Select [Maintenance Tools (Normal mode)].
3. Select [English].
4. Select [Maintenance Utility].
5. Select [System Information Management].
6. Insert a floppy disk into the floppy disk drive.
7. Select [Save].

Chapter 4

Configuring Your Server

Configuration and setup utilities are used to change your system configuration. You can configure your system, as well as option boards you may add to your system, using the BIOS SETUP Utility. Several unique system parameters are configured using the BIOS SETUP, which is stored in the system FLASH memory.

The RAID configuration utility configures the RAID System and logical drives connected to the Onboard RAID controller or Internal RAID Controller.

If your system has been factory configured, the BIOS SETUP or RAID configuration utility do not need to be run unless you want to change the password or security features, add certain types of option boards or devices, upgrade your system board, or change the RAID configuration.

This chapter also provides information on several system configuration parameters that are set by jumpers on the system board. However, these parameters do not usually require change.

SYSTEM BIOS (SETUP)

The SETUP utility is used to change system configuration parameters. This utility is pre-installed in the flash memory of the server and ready to run.

The server is configured with the correct parameters using the SETUP utility and shipped in the best conditions. Thus, you don't need to use the SETUP utility in most cases. However, you might wish to use the SETUP utility in the cases described below.

IMPORTANT:

- The SETUP utility is intended for system administrator use only.
- The SETUP utility allows you to set a password. The server is provided with two levels of password: Supervisor and User. With the Supervisor password, you can view and change all system parameters of the SETUP utility. With the User password, system parameters available for viewing and changing are limited.
- Do not set any password before installing the OS.
- The server contains the latest version of the SETUP utility. Dialog boxes appear on your SETUP utility, thus, may differ from descriptions in this manual. If you find anything unclear, see the online help or ask your service representative.
- Use the Exit menu when exiting the SETUP utility. Exiting the utility with the POWER switch or reset operation causes the stored parameters to lose.

Starting SETUP Utility

Powering on the server starts POST (Power On Self-Test) and displays its check results. If the NEC logo is displayed, press **Esc**.

After a few seconds, the following message appears at bottom left on the screen.

```
Press <F2> to enter SETUP
```

Press **F2** to start the SETUP utility and display its Main menu.

If you have previously set a password with the SETUP utility, the password entry screen appears. Enter the password.

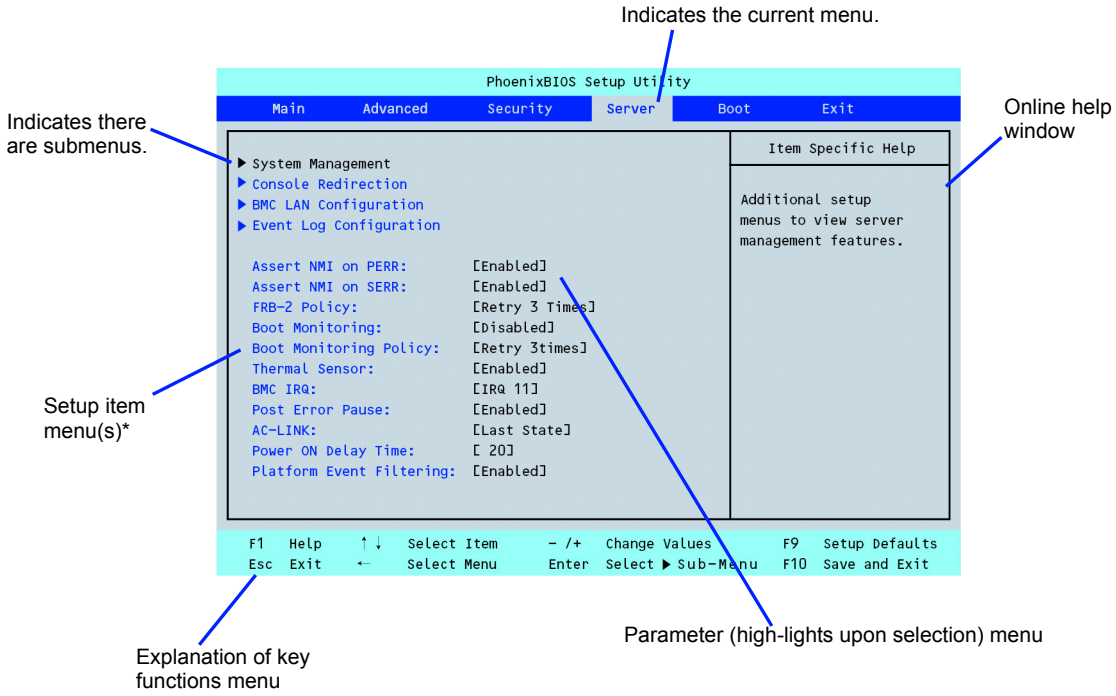
```
Enter password:[                ]
```

Up to three password entries will be accepted. If you fail to enter the password correctly for three consecutive times, the server halts. (You can no longer proceed.) Power off the server.

NOTE: The server is provided with two levels of password: Supervisor and User. With the Supervisor password, you can view and change all system parameters. With the User password, system parameters available for viewing and changing are limited.

Description on On-Screen Items and Key Usage

Use the following keyboard keys to work with the SETUP utility. (Key functions are also listed at the bottom of the screen.)


Indicates the current menu.
Indicates there are submenus.
Online help window
Setup item menu(s)*
Explanation of key functions menu
Parameter (high-lights upon selection) menu
PhoenixBIOS Setup Utility
Main
Advanced
Security
Server
Boot
Exit
System Management
Console Redirection
BMC LAN Configuration
Event Log Configuration
Assert NMI on PERR: [Enabled]
Assert NMI on SERR: [Enabled]
FRB-2 Policy: [Retry 3 Times]
Boot Monitoring: [Disabled]
Boot Monitoring Policy: [Retry 3times]
Thermal Sensor: [Enabled]
BMC IRQ: [IRQ 11]
Post Error Pause: [Enabled]
AC-LINK: [Last State]
Power ON Delay Time: [20]
Platform Event Filtering: [Enabled]
Item Specific Help
Additional setup menus to view server management features.
F1 Help ↑ ↓ Select Item - /+ Change Values F9 Setup Defaults
Esc Exit ← Select Menu Enter Select ▶ Sub-Menu F10 Save and Exit

* The menus displayed in gray indicates the information only or unchangeable secured by BIOS password.

Cursor (↑, ↓):	Selects an item on the screen. The highlighted item is currently selected.
Cursor (←, →):	Selects the Main, Advanced, Security, Server, Boot, or Exit menu.
– and **+**:	Changes the value (parameter) of the selected item. When a submenu option (an option preceded by "➤") is selected, these keys are disabled.
Enter	Press **Enter** to select (determine) parameters.
Esc	Exit SETUP and return to the previous screen.
F9:	Sets the parameter of the currently displayed item back to the factory set parameter.
F10:	Save and exit the SETUP utility.

Menu and Parameter Descriptions

The SETUP utility has the following six major menus:

- Main
- Advanced
- Security
- Server
- Boot
- Exit

To set minute functions, select a submenu from the above menus. The following describes available functions and parameters, as well as the factory-set, for each menu.

Main

Option	Parameter	Description	Your Setting
System Time	HH:MM:SS	Set the system time.	
System Date	MM/DD/YYYY	Set the system date.	
Hard Disk Pre-Delay	[Disabled] 3 seconds 6 seconds 9 seconds 12 seconds 15 seconds 21 seconds 30 seconds	Allows slower spin-up drives to come ready.	
Primary IDE Master/ Primary IDE Slave Secondary IDE Master/ Secondary IDE Slave	Select submenu	Set the information on the device connected to each channel on the submenu. The settings of some items may be changed. However, leave the items as they are at the shipment.	
Processor Settings	Select submenu	Shows the processor settings submenu.	
Language	[English (US)] Français (FR) Deutsch (DE) Español (SP) Italiano (IT)	Select which language BIOS displays.	

[ ]: Factory-set

Primary IDE Master/Primary IDE Slave/Secondary IDE Master/Secondary IDE Slave

Correspondence between the menu items and devices:

- Primary IDE Master: Optical disk drive (standard)
- Primary IDE Slave: None
- Secondary IDE Master: None
- Secondary IDE Slave: None

Option	Parameter	Description	Your Setting
Type	None User [Auto] CD-ROM	Selects the type of device attached to the IDE or serial ATA channel. It is strongly recommended to keep the factory setting [Auto].	
* Parameters are configured automatically by BIOS.			
Multi-Sector Transfers*	Disabled 2 Sectors 4 Sectors 8 Sectors 16 Sectors	Specifies the number of sectors that are transferred per block during multiple sector transfers.	
LBA Mode Control*	Enabled Disabled	Enable/disable LBA instead of cylinder, head, sector, addressing.	
32 Bit I/O	[Disabled] Enabled	Enable/disable the 32-bit IDE data transfer mode.	
Transfer Mode*	Standard Fast PIO 1 Fast PIO 2 Fast PIO 3 Fast PIO 4 FPIO 3/DMA1 FPIO 4/DMA2	Select the method for moving data to/from the drive.	
Ultra DMA*	Disabled Mode 0 Mode 1 Mode 2 Mode 3 Mode 4 Mode 5	Select the Ultra DMA mode used for moving data to/from the drive.	

[ ]: Factory-set

Processor Settings

Option	Parameter	Description	Your Setting
Processor Retest	[No] Yes	If yes, BIOS will clear historical processor status and retest the processor on the next boot.	
Processor Speed	nnn GHz	Displays clock speed for the processor. (View only)	
Processor 1 CPUID	Numeral Disabled	Displays CPU ID for processor, if present. "Disabled" indicates that the processor is defected. (View only)	
Processor 1 L2 Cache	nnn KB	Displays L2 cache size for processor.	
Processor 2 CPUID	Numeral Disabled	Displays CPU ID for processor, if present. "Disabled" indicates that the processor is defected. (View only)	
Processor 2 L2 Cache	nnn KB	Displays L2 cache size for processor.	
Execute Disable Bit	[Enabled] Disabled	Displayed only when the CPU supports Execute Disable Bit.	
Virtualization Technology	[Enabled] Disabled	Enables or disables the Intel(R) virtualization technology.	
C1 Enhanced Mode	[Enabled] Disabled	Enables or disables the C1 Enhanced Mode.	
Intel SpeedStep(R) Technology	[Enabled] Disabled	Fixed to "Disabled" if the processor does not support this feature.	

[ ]: Factory-set

Advanced

Option	Parameter	Description	Your Setting
Memory Configuration	–	Displays Memory Configuration submenu.	
PCI Configuration	–	Displays PCI Configuration submenu.	
Peripheral Configuration	–	Displays Peripheral Configuration submenu.	
Advanced Chipset Control	–	Displays Advanced Chipset Control submenu.	
Boot-time Diagnostic Screen	Enabled [Disabled]	When disabled, the BIOS will display the NEC logo during POST. Press **Esc** to switch to the POST execution screen.	
Reset Configuration Data	[No] Yes	Select "Yes" if you want to clear the system configuration data during the next boot. Automatically reset to "No" in the next boot.	
NumLock	On [Off]	Sets power on Numlock state.	
Memory/Processor Error	[Boot] Halt	If "Halt" is selected, the boot is stopped when POST error occurs.	

[ ]: Factory-set

Memory Configuration

Option	Parameter	Description	Your Setting
System Memory	nnn KB	Indicates the total capacity of the basic memory. (View only)	
Extended Memory	nnnnnnn KB	Indicates the total capacity of the extended memory. (View only)	
DIMM Group #1 - #6	Normal Disabled Not installed	Indicates the current memory status. "Normal" indicates the normal status, "Disabled" indicates a memory error, and "Not installed" indicates no DIMM installed (view only). DIMM Group #1: DIMM sockets #11 and #21 DIMM Group #2: DIMM sockets #31 and #41 DIMM Group #3: DIMM sockets #12 and #22 DIMM Group #4: DIMM sockets #32 and #42 DIMM Group #5: DIMM sockets #13 and #23 DIMM Group #6: DIMM sockets #33 and #43	
Memory Retest	Yes [No]	Causes BIOS to retest all memory on the next boot.	
Extended RAM Step	1MB 1KB Every location [Disabled]	"1MB" indicates that the memory test is done in the unit of 1MB. "1KB" indicates that the memory test is done in the unit of 1KB. "Every location" tests every memory location. "Disabled" indicates that only memory initialization is done. Only pressing **Space** is acceptable to suspend the test during the memory test.	
Memory RAS Feature	[Interleave] Mirror	Disables or enables memory mirroring feature. See "DIMM" in Chapter 9 for details.	
Sparing	[Disabled] Enabled	Disables or enables online spare memory feature. See "DIMM" in Chapter 9 for details.	

[ ]: Factory-set

PCI Configuration

– Onboard Video Controller submenu

Option	Parameter	Description	Your Setting
VGA Controller	Disabled [Enabled]	If Disabled, the BIOS will hold the embedded chip in reset.	
Onboard VGA Option ROM Scan	[Auto] Force	Allows selecting the onboard VGA controller or optional PCI VGA controller as the display device that will be active when the system boots. The “Force” option is selected to use the onboard VGA controller if the optional PCI VGA controller is installed in the system.	

[ ]: Factory-set

– Onboard LAN submenu

Option	Parameter	Description	Your Setting
LAN Controller	Disabled [Enabled]	If Disabled, the BIOS will hold the embedded chip in reset.	
LAN1 Option ROM Scan	Disabled [Enabled]	If Enabled, initialize device expansion ROM.	
LAN2 Option ROM Scan	Disabled [Enabled]	If Enabled, initialize device expansion ROM.	

[ ]: Factory-set

Option	Parameter	Description	Your Setting
PCI Slot 1B Option ROM	Disabled [Enabled]	Used to enable or disable an option ROM on a PCI board connected to the full-height riser card.	
PCI Slot 1C Option ROM	Disabled [Enabled]	Used to enable or disable an option ROM on a PCI board connected to the low-profile riser card.	

[ ]: Factory-set

Peripheral Configuration

IMPORTANT: Note that the interrupt and/or base I/O address are not overlapped with others. If the value set for the interrupt or base I/O address is used in another resource, the yellow asterisk (*) appears. Reset any item with the yellow asterisk properly.

Option	Parameter	Description	Your Setting
Serial Port A	Disabled [Enabled]	Selects whether serial port A is enabled or disabled.	
Base I/O address	[3F8] 2F8 3E8 2E8	Selects the base I/O address for serial port A.	
Interrupt	IRQ 3 [IRQ 4]	Selects the interrupt for a serial port A.	
Serial Port B	Disabled [Enabled]	Selects whether serial port B is enabled or disabled.	
Base I/O address	3F8 [2F8] 3E8 2E8	Selects the base I/O address for serial port A.	
Interrupt	[IRQ 3] IRQ 4	Selects the interrupt for a serial port A.	
USB Controller	[Enabled] Disabled	Selects the USB controller is enabled or disabled.	
USB 2.0 Controller	Disabled [Enabled]	Selects the USB 2.0 controller is enabled or disabled.	
Parallel ATA	Disabled [Enabled]	Selects parallel ATA is enabled or disabled.	
Serial ATA	Disabled [Enabled]	Selects whether the serial ATA is enabled or disabled.	
SATA Controller Mode Option	Compatible [Enhanced]	Selects an operation mode of onboard SATA controller. Displayed only when Serial ATA is enabled. Compatible mode: SATA drives are automatically detected and recognized as legacy mode. Enhanced mode: SATA drives are automatically detected and recognized as native mode.	
SATA AHCI	Disabled [Enabled]	Selects whether AHCI (Advanced Host Controller Interface) is enabled or disabled. Displayed only when [Enhanced] is selected for [SATA Controller Mode Option].	
SATA RAID	Disabled [Enabled]	When set to [Enabled], this menu appears if RAID configuration jumper switch is set to [RAID enable] position. See Chapter 4 for details.	

[ ]: Factory-set

Advanced Chipset Control

Option	Parameter	Description	Your Setting
Multimedia Timer	[Disabled] Enabled	Specify whether the system supports the multimedia timer feature.	
Intel(R) I/O AT	Disabled [Enabled]	Enables or disables the Intel(R) Acceleration technology.	
Wake On Ring	[Disabled] Enabled	Specify whether the remote power-on function through a serial port is enabled or disabled.	
Wake On RTC Alarm	[Disabled] Enabled	Specify whether the remote power-on function by using RTC alarm feature is enabled or disabled.	

[ ]: Factory-set

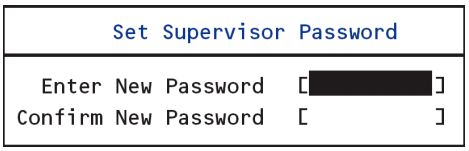
IMPORTANT:

- If the AC power is turned off while the Wake On Ring feature is enabled, this feature is disabled at the next system boot after AC power-on. You need to press the Power switch to boot the system. If the AC power is turned off, Wake On Ring feature on power management chip is disabled until the next DC power-on.
- To use this feature on Windows Server 2003, see Chapter 8 "Problems with Windows Server 2003".

Security

The Security menu appears if you move the cursor to the position of "Security."

Press **Enter** on "Set Supervisor Password" or "Set User Password," to display the following screen.



Enter the passwords on the dialog box. Passwords may have up to eight characters including alphanumerics and symbols.

IMPORTANT:

- User password can be set only when Supervisor password is already set.
- Set the passwords only after OS is installed.

See the table below for the items.

Option	Parameter	Description	Your Setting
Security Chip Configuration	–	Security Chip Configuration submenu is displayed.	
Supervisor Password Is	Clear Set	Status only, user cannot modify. Once set, this can be disabled by setting it to a null string, or by clearing password jumper on system board (see Configuring Mother Board Jumpers in this Chapter).	
User Password Is	Clear Set	Status only, user cannot modify. Once set, this can be disabled by setting it to a null string, or by clearing password jumper on system board (see Configuring Mother Board Jumpers in this Chapter).	
Set Supervisor Password	Up to eight alphanumerics	When the <Enter> key is pressed, the user is prompted for a password; press ESC key to abort. Once set, this can be disabled by setting it to a null string, or by clearing password jumper on system board (refer to Configuring Mother Board Jumpers in this chapter).	

Option	Parameter	Description	Your Setting
Set User Password	Up to eight alphanumerics	Supervisor password controls access to the setup utility. When Enter is pressed, the user is prompted for a password; press **Esc** to abort. Once set, this can be disabled by setting it to a null string, or by clearing password jumper on system board (refer to Configuring Mother Board Jumpers in this chapter).	
Password on boot	[Disabled] Enabled	Disables or enables password entry on boot.	
Fixed disk boot sector	[Normal] Write Protect	Will write protect the boot sector of the hard drive to prevent viruses from corrupting the drive under DOS if set to write protect.	
Power Switch Inhibit	[Disabled] Enabled	Enables or disables the POWER switch. If "Enabled" is selected, power-off with the POWER switch becomes unavailable after OS boot-up. (Forced shut down feature is always acceptable to the server. Forced shut down is a feature to shut down by pressing the POWER switch for at least four seconds.)	

[ ]: Factory-set

Security Chip Configuration Submenu

Option	Parameter	Description	Your Setting
TPM Support	[Disabled] Enabled	Disables or enables TPM feature.	
Current TPM State	–	Displays the current TPM state.	
Change TPM State	[No Change] Enable & Activate Deactivate & Disable Clear	Changes TPM state.	

[ ]: Factory-set

Server

Option	Parameter	Description	Your Setting
System Management	–	System Management submenu is displayed.	
Console Redirection	–	Console Redirection submenu is displayed.	
BMC LAN Configuration	–	BMC LAN Configuration submenu is displayed.	
Event Log Configuration	–	Event Log Configuration submenu is displayed.	
Assert NMI on PERR	Disabled [Enabled]	Specify whether to support PCI PERR or not.	
Assert NMI on SERR	Disabled [Enabled]	Specify whether to support PCI SERR or not.	
FRB-2 Policy	Disable FRB2 Timer Disable BSP Do Not Disable BSP [Retry 3 Times]	Set the FRB level 2 timer.	
Boot Monitoring	[Disabled] 5 Minutes 10 minutes 15 minutes 20 minutes 25 minutes 30 minutes 35 minutes 40 minutes 45 minutes 50 minutes 55 minutes 60 minutes	Specify whether to enable or disable the boot monitoring function on booting, or select the time limit for timeout. To use this function, install NEC ESMPRO Agent. Set this item to "Disabled" if the system is booted from OS without installation of NEC ESMPRO Agent.	
Boot Monitoring Policy	[Retry 3 Times] Always Reset	Specify the processing at the occurrence of timeout during boot monitoring. If [Retry 3 times] is selected, the system is reset after the occurrence of timeout and OS boot is retried up to three times. If [Always Reset] is selected, the system is reset after the occurrence of timeout and OS boot is retried repeatedly. * If no service partition exists in the system, OS boot is retried repeatedly from the system partition.	
Thermal Sensor	Disabled [Enabled]	Specify whether to enable or disable the thermal sensor monitoring function. If a thermal error is detected with this item being set to "Enabled", the system stops at the end of POST.	
BMC IRQ	Disabled [IRQ 11]	Determines routing of the BMC interrupt.	

Option	Parameter	Description	Your Setting
Post Error Pause	Disabled [Enabled]	Specify whether to stop the POST once at the end of POST if an error occurs during the POST.	
AC-LINK	Stay Off [Last State] Power On	Specify the state of power when the AC power to the server is turn off once and then on.	
Power ON Delay Time (Sec)	[20] - 255	Specify the power on delay time within the range between 0 and 255 seconds. The time specified is valid when "Power On" or "Last State" is specified for AC LINK.	
Platform Event Filtering	Disabled [Enabled]	Specify whether to enable or disable the platform event filtering (PEF) feature.	

[ ]: Factory-set

IMPORTANT: To power on the server from the UPS (Uninterruptible Power Supply), select [Server] - [AC LINK] - [Power On].

The table below shows the operation when the AC power to the server is turn off once and then on again, depending on the setting of "AC LINK."

System status before AC power off	Setting of AC LINK		
	Stay Off	Last State	Power On
Operating	Off	On	On
Aborting (DC power being off also)	Off	Off	On
Forced shutdown	Off	Off	On

* Press the power switch continuously for four seconds or longer. This forcibly turns off the power.

System Management Submenu

Option	Parameter	Description	Your Setting
BIOS Version	–	Displays the current BIOS version. (View only)	
Board Part Number	–	Displays the part number of mother board. (View only)	
Board Serial Number	–	Displays the serial number of mother board. (View only)	
System Part Number	–	Displays the part number of the system. (View only)	
System Serial Number	–	Displays the serial number of the system. (View only)	
Chassis Part Number	–	Displays the part number of the chassis. (View only)	
Chassis Serial Number	–	Displays the serial number of the chassis. (View only)	
Onboard LAN1 MAC Address	–	Displays the MAC address of the onboard LAN port 1. (View only)	
Onboard LAN2 MAC Address	–	Displays the MAC address of the onboard LAN port 2. (View only)	
Management LAN MAC Address	–	Displays the MAC address of the management LAN port. (View only)	
BMC Device ID	–	Displays BMC device ID. (View only)	
BMC Device Revision	–	Displays BMC device revision. (View only)	
BMC Firmware Revision	–	Displays BMC firmware revision. (View only)	
SDR Revision	–	Displays revision of the sensor data record.	
PIA Revision	–	Displays revision of the platform information area. (View only)	

[ ]: Factory-set

Console Redirection Submenu

Option	Parameter	Description	Your Setting
BIOS Redirection Port	[Disabled] Serial Port A Serial Port B	Specify the address/interrupt of the serial port to which a remote console is connected.	
Baud Rate	9600 [19.2K] 38.4K 57.6K 115.2K	Specify the baud rate used for the interface with successive remote consoles.	
Flow Control	None Xon/Xoff [CTS/RTS] CTS/RTS+CD	Specify the flow control method.	
Console Type	PC ANSI [VT100+] VT-UTF8	Specify the type of remote console.	
Continue Redirection after POST	Disabled [Enabled]	Specify whether to continue console redirection feature after completion of POST.	
Remote Console Reset	[Disabled] Enabled	Specify whether to enable or disable resetting by Escape command (Esc R) sent from the remote console.	

[ ]: Factory-set

BMC LAN Configuration Submenu

Option	Parameter	Description	Your Setting
IP Address	[192.168.001.001]	Specify an IP address for management LAN.	
Subnet Mask	[255.255.255.000]	Specify a subnet mask for management LAN.	
Default Gateway	[000.000.000.000]	Specify a default gateway for management LAN.	
DHCP	[Disabled] Enabled	Set to [Enabled] to obtain an IP address from DHCP server automatically. If you intend to specify an IP address manually, set to [Disabled].	
Web Interface	–	–	
HTTP	[Disabled] Enabled	Set to [Enabled] to use HTTP communication for Web interface.	
HTTP Port Number	[80]	Specify the TCP port number which the management LAN uses for HTTP communication.	
HTTPS	[Disabled] Enabled	Set to [Enabled] to use HTTPS communication for Web interface.	
HTTPS Port Number	[443]	Specify the TCP port number which the management LAN uses for HTTPS communication.	
Command Line Interface	–	–	
Telnet	[Disabled] Enabled	Set to [Enabled] to use Telnet communication as a command line interface.	
Telnet Port Number	[23]	Specify the TCP port number to be used for Telnet communication.	
SSH	[Disabled] Enabled	Set to [Enabled] to use SSH communication as a command line interface.	
SSH Port Number	[22]	Specify the TCP port number to be used for SSH communication.	
Clear BMC Configuration	[Enter]	Press **Enter** and select "Yes" to initialize the BMC configuration.	

[ ]: Factory-set

IMPORTANT: Notes on performing Clear BMC Configuration

- Executing "Load Setup Defaults" in BIOS SETUP utility does not restore the default value for settings related to management LAN of BMC. To restore the default value, you need to execute Clear BMC Configuration.
- It takes about several tens seconds until initialization completes after execution of Clear BMC Configuration.
- Executing Clear BMC Configuration also clears settings made in NEC DianaScope. Before execution, be sure make backup copy of setting information of NEC DianaScope.

NOTE: Executing [Save Custom Defaults/Load Custom Defaults] of BIOS SETUP does not save the settings you have made in BMC LAN Configuration menu.

Event Log Configuration Submenu

Option	Parameter	Description	Your Setting
System Event Log	–	System Event Log submenu is displayed.	
Clear All Event Logs	–	Press **Enter** and select "Yes" to clear the system event log.	

[ ]: Factory-set

Boot

If you move the cursor to the position of "Boot," the Boot menu appears, which is used to set the boot priority.

Indication	Device
USB CDROM	USB CD-ROM drive
IDE CD	ATAPI CD-ROM (including optical disk drive)
USB FDC	USB floppy disk drive
USB KEY	USB flash memory device
IDE HDD	IDE hard disk drives
PCI SCSI	Internal hard disk drives installed in your system (“Software RAID” is displayed in the RAID configuration.)
PCI BEV	**IBA GE Slot xxxx** Onboard LAN. LAN1: Slot 0C00, LAN2: Slot 0C01 **Other indication** Optional PCI board connected to the riser module.

1. When BIOS detects a bootable device, it displays the information on the device in the relevant indication.

   To boot the server from a desired device, the device must be registered as a boot device. (Up to eight boot devices can be registered.)

2. Pressing **X** after selecting a device allows the selected device to be registered as a boot device or deleted from the registration.

   With eight boot devices being registered, any other device cannot be registered as a boot device even if you press **X**. To register a device as a boot device newly, first delete the registration of a device registered as a boot device but not booted any more.

   Pressing **Shift** + **1** after selecting a device allows the selected device to be made enabled/disabled.

3. You can change the boot priority (first to eighth) of each device by using ↑, ↓, **+** and/or **–**.

   To change the priority of a device, move the cursor to the device by using the ↑ or ↓**,** and press **+** or **–**.

Exit

The options on the menu are described below.

> **IMPORTANT:** For 3.5-inch disk model, record the current SATA controller options in the Peripheral Configuration page of the Advance menu before reloading the Setup or custom defaults. The SATA controller options affect the RAID System configuration.

Exit Saving Changes

Exit after writing all modified BIOS SETUP item values to CMOS.

Exit Discarding Changes

Exit leaving CMOS unmodified. User is prompted if any of the setup fields ware modified.

Load Setup Defaults

Load default values for all BIOS SETUP items.

Load Custom Defaults

Load custom defaults for BIOS SETUP options.

Save Custom Defaults

Saves the current values as custom defaults. The “Load Custom Defaults” menu appears on the screen after saving the custom default values.

Discard Changes

Read the previous values of the all BIOS SETUP items from CMOS.

Save Changes

Write all BIOS SETUP item values to CMOS.

RAID SYSTEM CONFIGURATION

This section describes how to use the internal hard disk drives as RAID System by Onboard RAID Controller (LSI Embedded MegaRAID) installed in 3.5-inch disk model or Internal RAID Controller (equivalent to N8103-116) installed in 2.5-inch disk model.

About the optional RAID Controller for 3.5-inch disk model (N8103-116/117), refer to the documents provided with optional RAID Controller.

RAID

Overview of RAID System

What is RAID (Redundant Array of Inexpensive Disks)?

RAID is an abbreviation for "Redundant Array of Inexpensive Disks". The RAID technology allows more than one hard disk drive (HDD) to be handled collectively.

In actual, RAID can configure more than one HDDs as a single array (disk group) to operate the HDDs effectively. This can bring higher performance than a single HDD of a large capacity.

The Onboard RAID Controller (LSI Embedded MegaRAID) or Internal RAID Controller (equivalent to N8103-116) has a feature to divide a single disk group into several logical drives (virtual disks). The RAID controller recognizes these virtual disks as if it were a single hard disk drive. The RAID Controller accesses to more than one hard disk drive configuring a disk group in parallel.

Some RAID levels can recover data from remaining data and parity by using rebuild feature if an error occurs in a single HDD. This can provide high reliability for the system.

RAID Levels

The record mode enabling the RAID feature includes several levels. Among the levels, the Onboard RAID Controller (LSI Embedded MegaRAID) supports RAID levels 0 and 1. The Internal RAID Controller (equivalent to N8103-116) supports RAID levels 0, 1, 5, and 6. The number of hard disk drives required to create a disk group varies depending on the RAID level as shown in the table below.

RAID level	Number of required HDDs	
	Min.	Max.
RAID 0	1	8
RAID 1	2	2
RAID 5	3	8
RAID 6	3	8

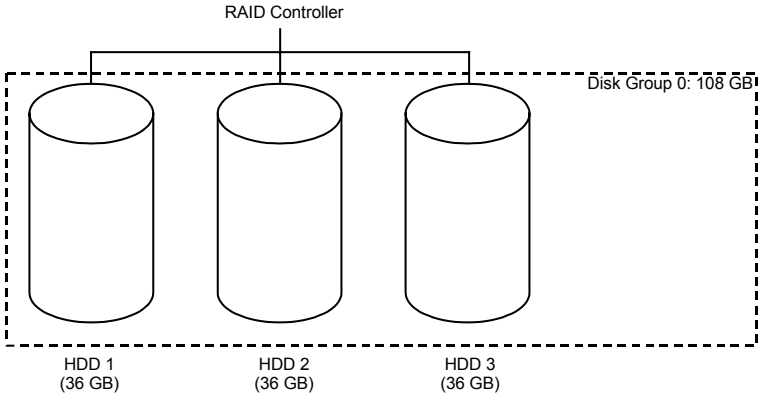
IMPORTANT: To use RAID 5 or RAID 6, with Internal RAID Controller (equivalent to N8103-116), you need to additionally install the optional N8103-119 RAID Upgrade Kit.

NOTE: For details of the RAID levels, see "RAID Levels" described later in this chapter.

Disk Group

A disk group is configured with more than one HDDs.
The allowable number of disk groups is equal to the number of HDDs.

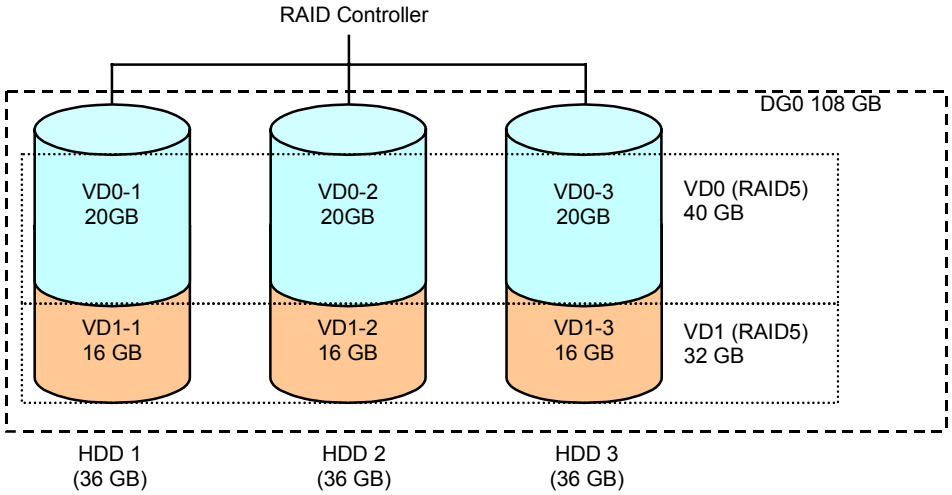
The figure below shows a sample configuration. The three HDDs are connected to the Onboard RAID Controller (LSI Embedded MegaRAID) or Internal RAID Controller (equivalent to N8103-116), creating one disk group (DG).



Virtual Disk

Virtual disk is a logical drive defined in disk group. It is recognized as a physical drive by OS. The allowable number of virtual disks is up to 16 per disk group, or up to 64 per controller.

The figure below shows a sample configuration in which the Onboard RAID Controller (LSI Embedded MegaRAID) or Internal RAID Controller (equivalent to N8103-116) is connected with three HDDs, creating one Disk Group. Two RAID5 virtual disks (VD) are defined in the Disk Group.



Parity

The parity means redundant data. A single set of redundant data is created from the data saved in more than one HDD.

The created redundant data is used for data recovery when a HDD is defected.

Hot-Swap

The hot-swap enables a HDD to be removed (or replaced) under system operation.

Hot-Spare

The hot-spare is prepared as an auxiliary HDD substituting for a defected HDD included in a logical drive which is configured at a redundant RAID level. Detecting a HDD fault, the system disconnects the HDD (or makes it offline) and starts rebuild using the hot-spare.

RAID Levels

Characteristics of RAID Levels

The table below lists the characteristics of the RAID levels.

Level	Function	Redundancy	Characteristics
RAID0	Striping	No	• Data read/write at the highest rate • Largest capacity • Capacity: (capacity of single HDD) × (number of HDDs)
RAID1	Mirroring	Yes	• Two HDDs required • Capacity: capacity of single HDD
RAID5	Striping of both data and redundant data	Yes	• Three or more HDDs required • Capacity: (capacity of single HDD) × ((number of HDDs) - 1)
RAID6	Striping of both data and redundant data	Yes	• Three or more HDDs required • Capacity: (capacity of single HDD) × ((number of HDDs) - 2)

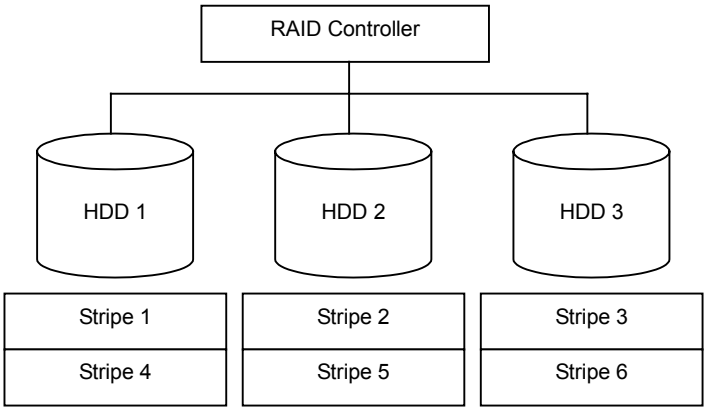
IMPORTANT: To use RAID 5 or RAID 6 with Internal RAID Controller (equivalent to N8103-116), you need to additionally install the optional N8103-119 RAID Upgrade Kit.

RAID0

In RAID0, data to be recorded is distributed to HDDs. The mode is called "striping".

In the figure below, data is recorded in stripe 1 (disk 1), stripe 2 (disk 2), and stripe 3 (disk 3)… in the order. Because RAID0 allows all HDDs to be accessed collectively, it can provide the best disk access performance.

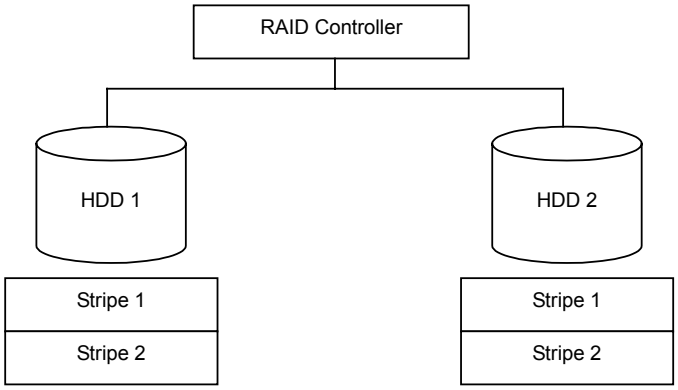
IMPORTANT: RAID0 cannot have data redundancy. If a HDD is defected, the data saved in the HDD cannot be recovered.



RAID1

In the RAID1 level, data saved in a HDD is written to another HDD without change. The mode is called "mirroring".

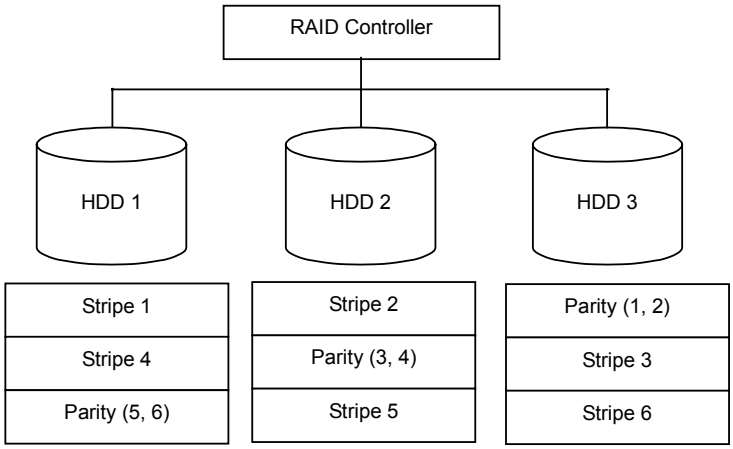
When data is written onto a single HDD, the same data is written onto another HDD. If either of the HDDs is defected, the other HDD containing the same data can substitute for the defected HDD. Thus the system can continue to operate without interruption.



RAID5

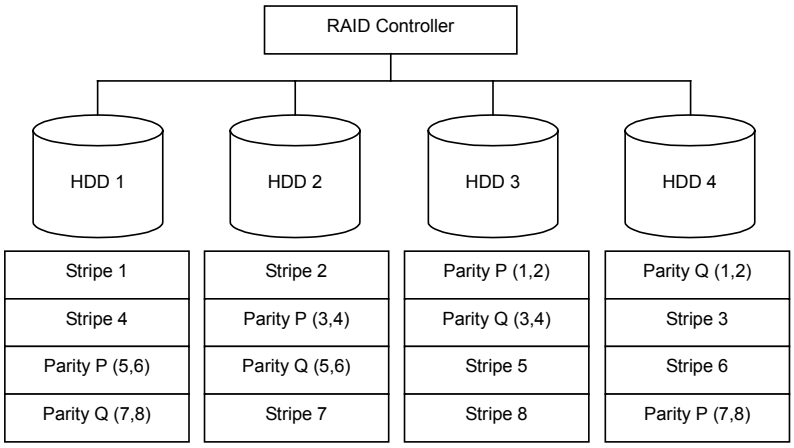
In RAID5, data is distributed to HDDs by striping and, at the same time, the parity (redundant data) is distributed to the HDDs. This mode is called "striping with distributed parity".

Each of stripe x, stripe x+1, and parity (x, x+1) created from stripe x and stripe x+1 is written onto a specific HDD. Accordingly, the total capacity assigned to the parity is just the same as the capacity of a single HDD. If any one of the HDDs configuring a logical drive is defected, data is still available with no problems.



RAID6

A RAID 6 extends RAID 5 by adding an additional parity block (Q) created by different calculation method such as weighting by some factor, thus it uses block-level striping with two parity blocks distributed across all member disks. This mode is called "striping with duplex and distributed parity". Accordingly, the total capacity assigned to the parity is just the same as the capacity of two HDDs. If any two of the HDDs configuring a logical drive are defected, data is still available with no problems.



Configuration by Onboard RAID Controller (3.5-inch Disk Model)

This section describes how to use the internal hard disk drives as RAID System by Onboard RAID Controller (LSI Embedded MegaRAID) of 3.5-inch disk model.

Installing the Hard Disk Drives

Install the two or more SAS hard disk drives to your server. See Chapter 9 for detail.

IMPORTANT: Use two hard disk drives of the same revolution. In addition, use two hard disk drives of the same capacity if you are going to configure RAID1.

Enabling RAID Feature

To configure a hard disk drive as RAID System, change the BIOS setting or the RAID System configuration jumper switch on mother board.

NOTE: The RAID System is factory-set to "Enabled".

⚠ WARNING

Observe the following instructions to use the server safely. Failure to follow these instructions may result in death or serious personal injury. See pages 1-3 to 1-8 for details.

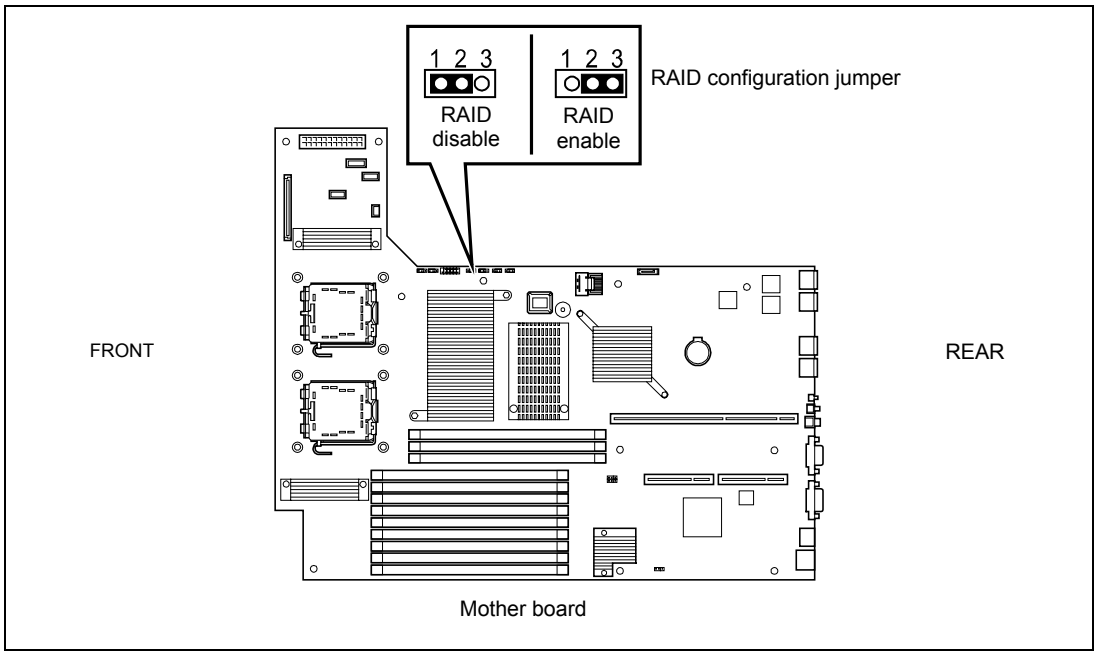
- Do not disassemble, repair, or alter the server.
- Do not remove the lithium battery.

⚠ CAUTION

Observe the following instructions to use the server safely. Failure to follow these instructions may result in death or serious personal injury. See pages 1-3 to 1-8 for details.

- Make sure to complete board installation.
- Do not install the server on a rack with leaving covers removed.
- Do not pinch your finger with mechanical components.
- Note high temperature.
- Do not pull out a device from the rack if the rack is unstable.
- Do not leave more than one device being pulled out from the rack.

1. See the section "Preparing for Installation and Removal" as described in Chapter 9 of this guide to prepare.
2. Remove the logic cover (see Chapter 9).
3. Remove the riser card (see Chapter 9).
4. Locate the position of the RAID configuration jumper on the mother board as shown below.



5. Remove the jumper from position 2 – 3 on jumper block.
6. Reinstall the jumper on position 1 – 2 on jumper block.
7. Reinstall the server removed in Step 2.
8. Plug the power cord to your server and turn on the server.
9. Run the BIOS SETUP utility described earlier in the chapter.
10. Choose the Peripheral Configuration submenu in the Advanced menu.
11. Change the options as follows.

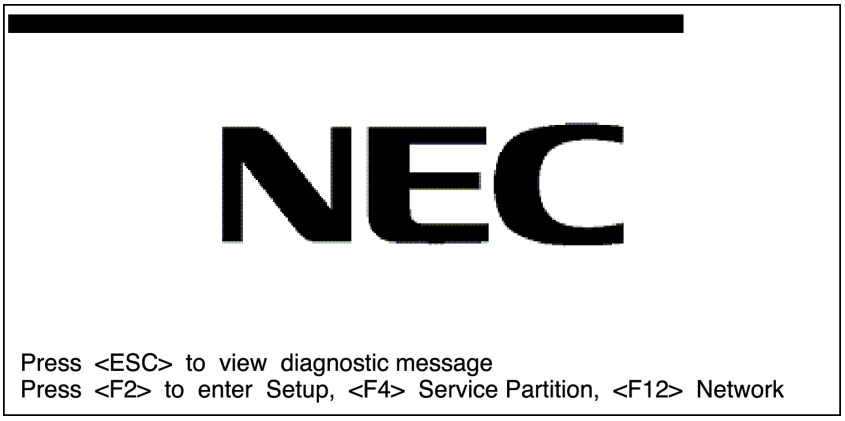
    SATA Controller Mode Option: Enhanced

    SATA RAID: Enabled
12. Save and exit the BIOS SETUP utility

Running LSI Software RAID Configuration Utility

1. When the following screen appears after you have powered on the server, press **Esc**.

   The POST screen appears.

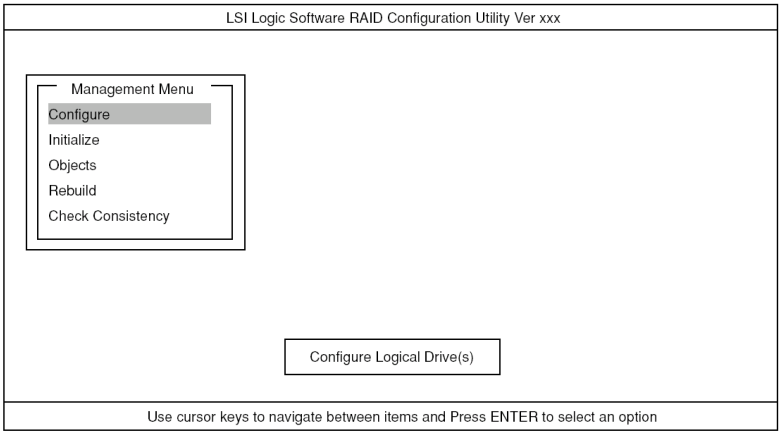


2. Check the description as shown below on the POST screen, then press **Ctrl** + **M**.

```
LSI SoftwareRAID BIOS Version xxxxxx
LSI MPT RAID Found at PCI Bus No:xx Bev No:xx
Scanning for port 00 Responding xxxxxxxx xxxxMB
  Standard FW xxx DRAM=128MB(SDRAM)
xx Logical drive(s) Configured
Press <Ctrl><M> to Run LSI Software RAID Configuration Utility
```

   LSI Software RAID Configuration Utility starts.

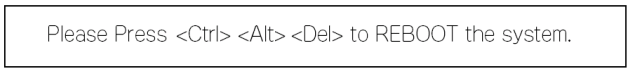
   If you fail to press **Ctrl** + **M** and the system proceeds without displaying the following menu screen, reboot the system, and press **Ctrl** + **M** on POST screen.



LSI Software RAID Configuration Utility TOP Menu (Management Menu)

To quit the utility, press **Esc** in the TOP menu of LSI Software RAID Configuration Utility.

When a confirmation message appears, select [Yes].



When the above message appears, press **Ctrl** + **Alt** + **Delete**.

The server is rebooted.

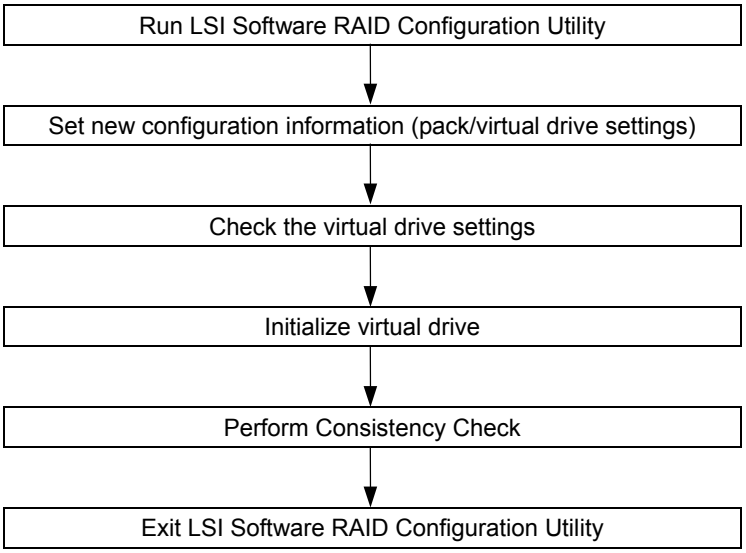
Menu Tree

+: Selection/execution parameter ✶: Setting parameter. •: Information display
>: Can be set (modified) after creation of virtual drive

Menu	Description
+Configure	Performs Configuration settings
+Easy Configuration	Set configuration (Using fixed value)
+New Configuration	Set new configuration
+View/Add Configuration	Additional setting / viewing configuration
+Clear Configuration	Clear configuration
+Select Boot Drive	Chose Bootable Virtual Drive
+Initialize	Initialize virtual drive
+Objects	Various settings
+Adapter	Set disk array controller
+Sel. Adapter	Clear configuration
✶Rebuild Rate	30
✶Chk Const Rate	30
✶FGI Rate	30
✶BGI Rate	30
✶Disk WC	Off
✶Read Ahead	On
✶Bios State	Enable
✶Cont on Error	Yes
✶Fast Init	Enable
✶Auto Rebuild	On
✶Auto Resume	Enable
✶Disk Coercion	1GB
✶Factory Default	
+Virtual Drive	Virtual drive operation
+Virtual Drives	Select virtual drive (when multiple virtual drives exist)
+Initialize	Initialize virtual drive
+Check Consistency	Check virtual drive redundancy
+View/Update Parameters	Display virtual drive information
• RAID	Display RAID level
• SIZE	Display virtual drive capacity
• Stripe SIZE	Display stripe size
• #Stripes	Display the number of hard disk drives in virtual drive
• State	Display virtual drive status
• Spans	
• Disk WC	Off: Write through On: Write back
• Read Ahead	
+Physical Drive	Physical drive operation
+Physical Drive Selection Menu	Select physical drive
+Make HotSpare	Set as hot-spare disk for auto rebuilding
+Force Online	Make a disk online
+Force Offline	Make a disk offline
+Drive Properties	Display hard disk drive information
• Device Type	Hard disk drive type
• Capacity	Hard disk drive capacity
• Product ID	Hard disk drive model
• Revision No.	Hard disk drive revision
+Rebuild	Perform rebuilding
+Check Consistency	Perform virtual drive redundancy check

Operating Procedures for Configuration Utility

Creating/Adding Configuration


Run LSI Software RAID Configuration Utility
Set new configuration information (pack/virtual drive settings)
Check the virtual drive settings
Initialize virtual drive
Perform Consistency Check
Exit LSI Software RAID Configuration Utility

1. Run LSI Software RAID Configuration Utility.

Select "Configure" → "New Configuration" from the TOP menu (Management Menu).

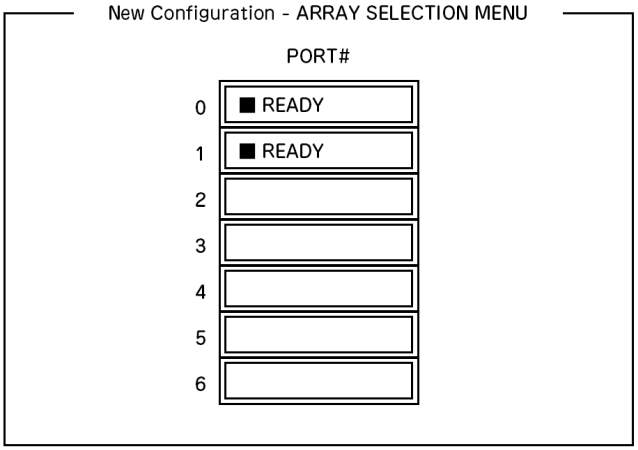
Select "View/add Configuration" to add configuration.

IMPORTANT:

- Creating a configuration using "New Configuration" menu clears the existing configuration information. To add configuration information to the existing configuration, select "View/add Configuration."
- You cannot create Spanning of RAID1 or set the virtual drive capacity on "Easy Configuration" menu.
  Use "New Configuration" or "View/Add Configuration" instead.

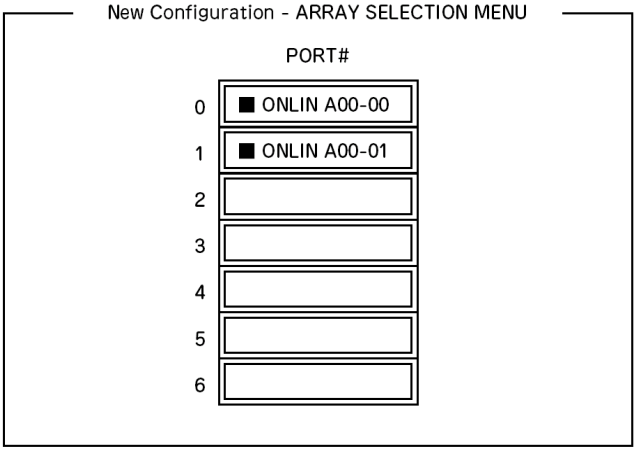
2. When a confirmation message (Proceed?) is displayed, select "Yes."

The SCAN DEVICE starts (scanning information is displayed at the bottom of the screen). Upon completion of SCAN DEVICE, the "New Configuration - ARRAY SELECTION MENU" screen appears.



3. Move the cursor onto the hard disk drive to be packed by using cursor key and then press **Space** to select the hard disk drive.

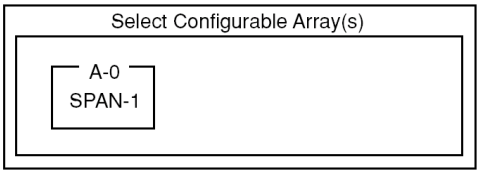
The display for the selected hard disk drive changes from READY to ONLINE.



4. Press **F10** to set "Select Configurable Array(s)".

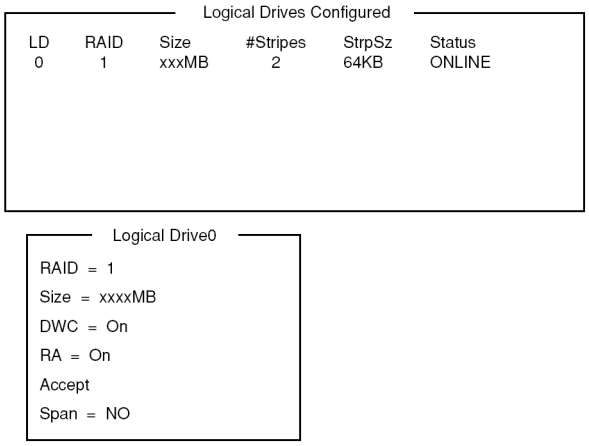
5. Press **Space**.

SPAN-1 is set.



6. Press **F10** to create virtual drive.

The "Virtual Drives Configure" screen appears. (The figure below shows an example of RAID1 configured with two hard disk drives.)



7. Select "RAID," "Size", "DWC", "RA", or "Span" by using cursor keys. Then press Enter to fix the selection and set each value.

(1) "RAID": Sets RAID level.

Parameter	**Remarks**
0	RAID0
1	RAID1

The selectable RAID level varies depending on the number of hard disk drives that configure a pack.

(2) "Size": Sets virtual drive size.

Up to 8 virtual drives can be created per RAID Controller.

(3) "DWC": Sets parameter for Disk Write Cache.

Parameter	Remarks
Off	Write through
On *1	Write back

*1 Recommended setting.
"Write-back On" enables good performance, however, cache data may be lost at an unexpected power failure. "Write-back Off" reduces performance by approximately 50%.

(4) "RA": Sets parameter for Read Ahead.

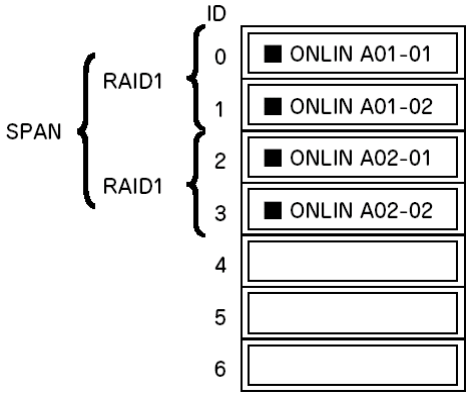
Parameter	Remarks
Off	Does not perform read ahead.
On	Performs read ahead.

(5) "Span: Sets Span.

Parameter	Remarks
SPAN=NO	Does not set span.
SPAN=YES	Sets span.

When performing SPAN, create two or more sets of the same pack at pack creation, as shown in the figure below.

SPANNING of RAID1



8. When all settings are completed, select "Accept" and then press **Enter** to create virtual drive.

The created virtual drive is displayed in the "Virtual Drive Configured" screen.

9. After creating virtual drive, press **Esc** to close the screen.

Go back to the "Save Configuration?" screen and then select "Yes" to save the configuration.

10. When the confirmation message shows that the configuration has been saved, press **Esc** to return to the TOP menu screen.

11. On the TOP menu screen, select "Objects" → "Virtual Drive" → "View/Update Parameters" to check virtual drive information.

12. Select "Initialize" in the TOP menu screen.

13. When the "Virtual Drives" screen appears, move the cursor to the virtual drive to be initialized, and press **Space**.

The virtual drive is selected.

14. After selecting virtual drive, press **F10** to start initialization.

A confirmation screen for execution appears. Select "Yes" to start initialization.

When the progress bar in the "Initialize Virtual Drive Progress" screen indicates 100%, initialization is completed.

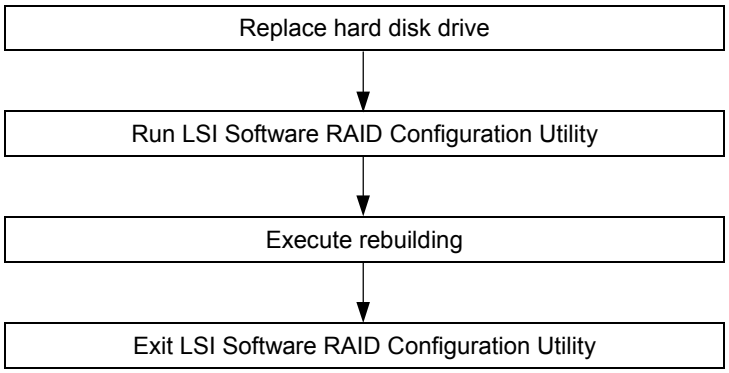
15. Execute Check Consistency on the virtual drive that has been initialized.

See "Check Consistency" for details.

16. Press **Esc** to return to the TOP menu and exit from LSI Software RAID Configuration Utility.

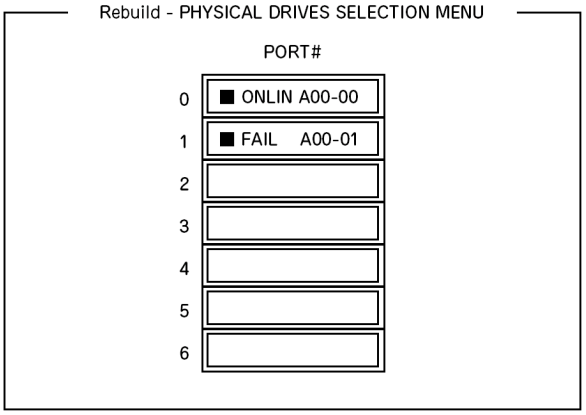
IMPORTANT: Be sure to execute Check Consistency after creating configuration.

Manual Rebuild


Replace hard disk drive
Run LSI Software RAID Configuration Utility
Execute rebuilding
Exit LSI Software RAID Configuration Utility

1. Replace a hard disk drive and turn on the server.
2. Run LSI Software RAID Configuration Utility.
3. Select "Rebuild" from the TOP menu.

   The "Rebuild – PHYSICAL DRIVES SELECTION MENU" screen appears.



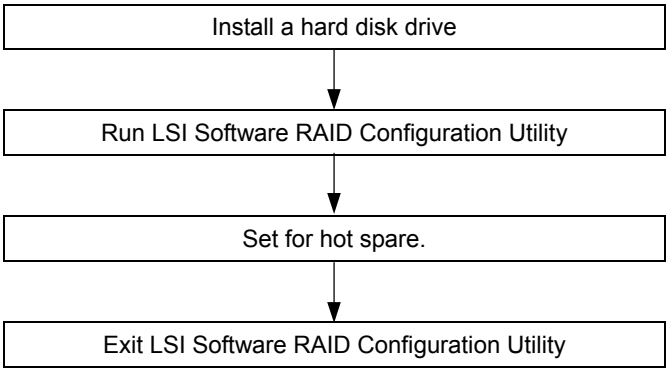
4. Move the cursor onto the hard disk drive displaying "FAIL," and then press **Space** to select it.

   Multiple hard disk drives can be selected (simultaneous rebuilding.)
5. The "FAIL" indication for the hard disk drive selected starts blinking.
6. When hard disk drive has been selected, press **F10** to start rebuilding.
7. When confirmation screen for execution appears. Select "Yes".

   The rebuild process starts.

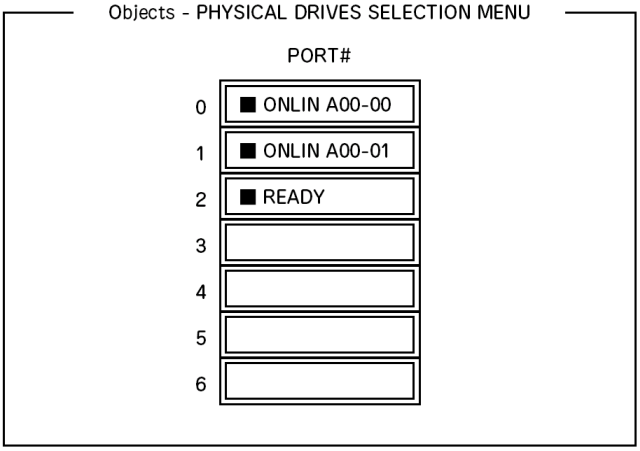
   When the progress bar in the "Rebuild Physical Drives in Progress" screen indicates 100%, rebuilding is completed.
8. Press **Esc** to return to the TOP menu and exit LSI Software RAID Configuration Utility.

Setting Hot Spare


Install a hard disk drive
Run LSI Software RAID Configuration Utility
Set for hot spare.
Exit LSI Software RAID Configuration Utility

1. Install a hard disk drive to be used as hot spare, and then turn on the server.
2. Run LSI Software RAID Configuration Utility.
3. Select "Objects" → "Physical Drive" from the TOP menu.

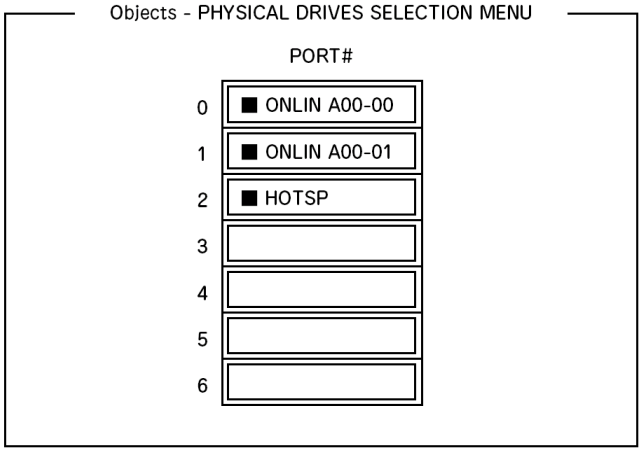
   The "Objects - PHYSICAL DRIVE SELECTION MENU" screen appears.



4. Move the cursor onto the hard disk drive to be used as hot spare and press **Enter**.
5. The "Port #X" screen appears. Select "Make HotSpare."
6. A confirmation screen appears. Select "Yes."

   The hard disk drive indication is changed to "HOTSP."

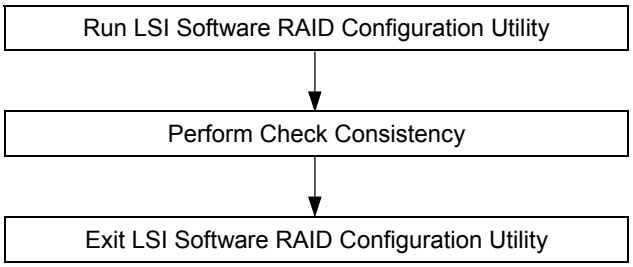
7. Press **Esc** to return to the TOP menu and exit LSI Software RAID Configuration Utility.



IMPORTANT:

- Select "Objects" → "Physical Drive" → "Port #X" → "Force Offline" to cancel the hot spare setting.
- When two or more hard disk drives (of the same capacity) are assigned as hot spare, rebuilding is performed in order starting from the one with the smaller CH number/ID number.

Check Consistency


Run LSI Software RAID Configuration Utility
Perform Check Consistency
Exit LSI Software RAID Configuration Utility

1. Run LSI Software RAID Configuration Utility.
2. Select "Check Consistency" from the TOP menu.

   The "Virtual Drives" screen appears.
3. Move the cursor onto the virtual drive to be checked, and press **Space** to select it.
4. When virtual drive has been selected, press **F10** to start consistency check.
5. A confirmation screen for execution appears. Select "Yes".

   The consistency check starts.

   When the progress bar in the "Check Consistency Progress" screen indicates 100%, the consistency check is completed.
6. Press **Esc** to return to the TOP menu and exit LSI Software RAID Configuration Utility.

IMPORTANT: Be sure to execute Check Consistency after creating configuration.

Others

- Clear Configuration

  Clears configuration information. Select "Configure" → "Clear Configuration" from the TOP menu. Executing "Clear Configuration" clears all configuration information on the RAID Controller and hard disk drives. The configuration information on all channels of the RAID Controller is also cleared.

  NOTES:

  - When configuration information on the RAID Controller and that on the hard disk drive do not match (excluding at replacement of faulty RAID Controller), configuration mail fail if you select the configuration information on the RAID Controller. In this case, execute "Clear Configuration" to create configuration again.
  - LSI Software RAID Configuration Utility cannot delete each virtual drive. Use Universal RAID Utility instead.

- Force Online

  Puts a hard disk drive being in the FAIL status online.

  Select "Objects" → "Physical Drive" → (select hard disk drive) → "Force Online" from the TOP menu.

- Rebuild Rate

  Sets the Rebuild Rate.

  Select "Objects" → "Adapter" → "Sel. Adapter" → "Rebuild Rate" from the TOP menu.

  Available value is between 0% and 100%. Default value (recommended) is 30%.

- Hard disk drive information

  Checks hard disk drive information.

  Select "Objects" → "Physical Drive" → (select hard disk drive) → "Drive Properties" from the TOP menu.

LSI Software RAID Configuration Utility and Universal RAID Utility

You can use Universal RAID Utility for configuration and management, monitoring of RAID System after start up operating system.

The point to keep in mind when I use Universal RAID Utility together with LSI Software RAID Configuration Utility is as follows.

Terms

LSI Software RAID Configuration Utility and Universal RAID Utility are different in term. When you use Universal RAID Utility together with LSI Software RAID Configuration Utility, please convert terms by the following list.

Term of LSI Software RAID Configuration Utility	Term of Universal RAID Utility
Adapter	RAID Controller
Logical Drive	Logical Drive
Array	Disk Array
Physical Drive	Physical Device

Number and ID

The number to manage each component of disk array of Universal RAID Utility is different to LSI Software RAID Configuration Utility.

Adapter and RAID Controller

LSI Software RAID Configuration Utility manages Adapter by a number beginning with 0. You can see a number of Adapter where [Sel. Adapter] in [Objects] menu. Universal RAID Utility manages RAID Controller by a number beginning with 1. You can see a number of RAID Controller where [Number] in the property of RAID Controller on RAID Viewer or [RAID Controller #X] in the property of RAID Controller on raidcmd command.

Also, you can see the number of Adapter managed by LSI Software RAID Configuration Utility where [ID] in the property of RAID Controller by Universal RAID Utility.

Logical Drive

LSI Software RAID Configuration Utility manages Logical Drive by a number beginning with 0. You can see a number of Logical Drive where [Logical Drives] in [Objects] menu.

Universal RAID Utility manages Logical Drive by a number beginning with 1. You can see a number of Logical Drive where [Number] in the property of Logical Drive on RAID Viewer or [RAID Controller #X Logical Drive #Y] in the property of Logical Drive on raidcmd command.

Also, you can see the number of Logical Drive managed by LSI Software RAID Configuration Utility where [ID] in the property of Logical Drive by Universal RAID Utility.

Disk Array

LSI Software RAID Configuration Utility manages Disk Array by a number beginning with 0. You can see a number of Disk Array where [Axx] of [Objects - PHYSICAL DRIVE SELECTION MENU] DG X] in [Objects] menu.

Universal RAID Utility manages Disk Array by a number beginning with 1. You can see a number of Disk Array where [Disk Array] in the property of Logical Drive on RAID Viewer or [RAID Controller #X Disk Array #Y] in the property of Disk Array on raidcmd command.

Physical Drive and Physical Device

LSI Software RAID Configuration Utility manages Physical Drive by ID. You can see ID of Physical Drive where [Port #] of [Objects - PHYSICAL DRIVE SELECTION MENU] DG X] in [Objects] menu.

Universal RAID Utility manages Physical Device by a number beginning with 1 and ID. The ID is same value of ID on LSI Software RAID Configuration Utility. You can see a number and ID of Physical Device where [Number] and [ID] in the property of Physical Device on RAID Viewer or [RAID Controller #X Physical Device #Y] and [ID] in the property of Physical Device on raidcmd command.

Setting of Priority

LSI Software RAID Configuration Utility displays and sets Rebuild Priority and Consistency Check Priority of RAID Controller by percentage. But, Universal RAID Utility uses three levels as High/Middle/Low for them.

The setting value of LSI Software RAID Configuration Utility and the display level of Universal RAID Utility

Item	Setting value of LSI Software RAID Configuration Utility	Universal RAID Utility Level
Rebuild Priority Rebuild Rate (LSI Software RAID Configuration Utility)	15 to 100	High
	8 to 14	Middle
	0 to 7	Low
Consistency Check Priority Chk Const Rate (LSI Software RAID Configuration Utility)	15 to 100	High
	8 to 14	Middle
	0 to 7	Low

The setting level of Universal RAID Utility and the setting value

Item	Setting level of Universal RAID Utility	Setting value
Rebuild Priority Rebuild Rate (LSI Software RAID Configuration Utility)	High	90
	Middle	50
	Low	10
Consistency Check Priority Chk Const Rate (LSI Software RAID Configuration Utility)	High	90
	Middle	50
	Low	10

NOTES:

- LSI Software RAID Configuration Utility can set FGI Rate (Foreground Initialize) and BGI Rate (Background Initialize Priority). But Universal RAID Utility can't set it.
- Universal RAID Utility can set Initialization Priority, but it can't set it to the LSI Embedded MegaRAID. Therefore, Universal RAID Utility doesn't display [Initialization Priority] in the property of RAID Controller. Also, it will fail that you change the Initialization Priority by raidcmd command.

Configuration by Internal RAID Controller (2.5-inch Disk Model)

This section describes how to use the internal hard disk drives as RAID System by Internal RAID Controller (equivalent to N8103-116) of 2.5-inch disk model.

Rebuild

If a HDD is defected, the rebuild feature can recover the data in the defected HDD. The rebuild can be applied to redundant virtual disks in the RAID1, RAID5, or RAID6 level.

Manual Rebuild

The manual rebuild can be performed by using Universal RAID Utility, the management utility of the Internal RAID Controller (equivalent to N8103-116). Select a HDD and start the rebuild manually.

For the detailed operation, refer to the "Universal RAID Utility User's Guide" in NEC EXPRESSBUILDER DVD that comes with the server.

Auto Rebuild

The Internal RAID Controller (equivalent to N8103-116) can automatically start the rebuild without use of any utility such as Universal RAID Utility.

The auto rebuild includes two types as follows:

- Standby rebuild

  Automatic rebuild by using hot-spares. In the configuration including hot-spares, the rebuild is performed automatically if a HDD assigned to a virtual disk is defected.

- Hot-swap rebuild

  Automatic rebuild by hot-swapping defected HDD.

IMPORTANT: Note the following for the rebuild:

- The HDD used for rebuild should have the same capacity, rotation speed, and standard as the defected HDD.
- During rebuild, the processing rate is decreased due to much load.
- During rebuild, do not shutdown or reboot the server. If the server is shutdown by an unforeseen accident such as power interruption, turn on the power again as soon as possible. The rebuild is automatically restarted.
- The interval from the removal of the defected HDD to the installation of a substitute HDD should be 60 sec or longer.
- If the hot-swap rebuild does not operate, perform the manual rebuild.

Patrol Read

The patrol read gives the read & verify test in the entire area of HDDs. It can be performed for all HDDs assigned to virtual disks and hot-spares.

The Patrol Read allows subsequent defects of HDDs to be detected and repaired.

For HDDs configuring redundant virtual disks or those assigned to hot-spares, error sectors detected during Patrol Read can be repaired.

IMPORTANT: Note the following for the patrol read:

- For the Internal RAID Controller (equivalent to N8103-116), Patrol Read feature is factory-set to "Enabled".
- To change settings of Patrol Read, use Universal RAID Utility.
- If the system is restarted while running Patrol Read, Patrol Read resumes from that point.

Consistency Check

The Consistency Check is used to check consistency among virtual drives. It is available for redundant virtual drives except for RAID0. It is also available for host spare.

Consistency Check can be performed through WebBIOS or Universal RAID Utility.

Consistency Check performs not only consistency check but also repair of error sectors. Accordingly, it can be used as preventive maintenance.

IMPORTANT: Note the following for Consistency Check:

- During Consistency Check, the processing rate is decreased due to much load.
- If the system is restarted, the Consistency Check is aborted. However, the Consistency Check resumes after restart.
- To schedule execution of Consistency Check, use WebBIOS, not the Universal RAID Utility

Background Initialize

The Background Initialize is automatically executed when RAID5 virtual disk is created in the disk group composing of five or more HDDs.

The Background Initialize performs the parity generation processing in the background to the area not initialized. The processing is equivalent to that of Consistency Check.

However, the Background Initialize is not performed in the following cases.

- Full Initialize has already been executed and completed normally before executing Background Initialize.

  (*) Full Initialize is a function to clear the entire area of a virtual disk with "0".

- Consistency Check has already been executed and completed normally before executing Background Initialize.
- Rebuild has already been executed and completed normally before executing Background Initialize (for RAID5 only).
- "Yes" is specified for "Disable BGI" in VD Definition.
- Virtual disk is in degraded or offline state.
  Background Initialize is performed if the virtual disk of RAID6 is partially degraded.

The Background Initialize is executed again if any of the following cases occurred in the virtual disk on which the Background Initialize has completed.

- When the virtual disk is degraded or offline, you execute Make Online to HDD being in offline status, and the virtual disk becomes Optimal state.
- When you replace the RAID Controller with the maintenance parts and others.
- When you execute Reconstruction to existing virtual disk to make RAID5 VD with five or more HDDs.

IMPORTANT: Note the following for Background Initialize:

- During Background Initialize, the processing rate is decreased due to much load.
- Background Initialize will resume a few minutes later even if it is interrupted.

Reconstruction

The reconstruction feature is used to change configuration and/or RAID level of existing virtual disk. The Reconstruction contains the following three features, however, the Internal RAID Controller (equivalent to N8103-116) supports "Migration with addition" only.

> **IMPORTANT:** You can use WebBIOS for Reconstruction. Universal RAID Utility does not support Reconstruction.

Removed physical drive

Unsupported.

Migration only

Unsupported.

Migration with addition

Use this feature to add HDDs to existing virtual disk. The execution patterns are as shown below (α: Number of HDDs to be added).

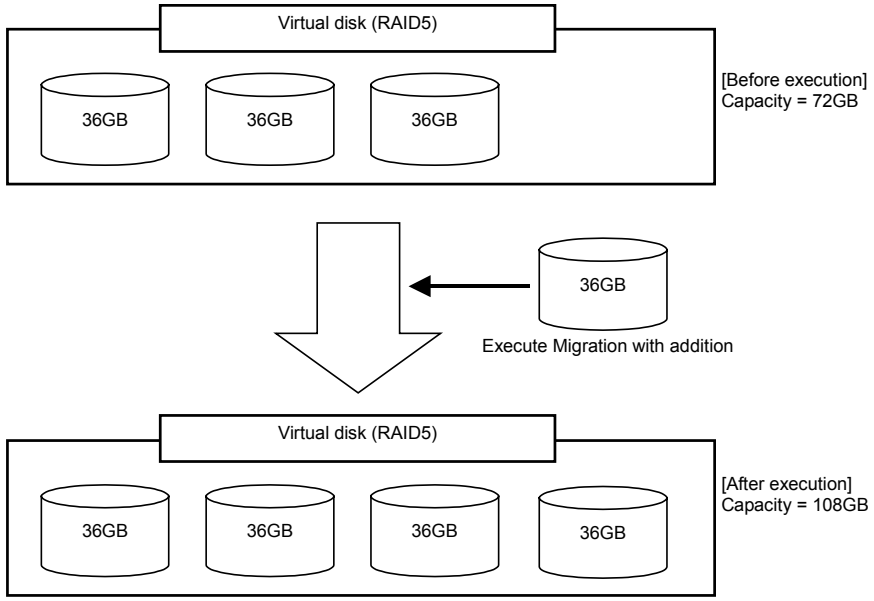
Before execution		After execution		Description
RAID level	Number of HDDs	RAID level	Number of HDDs	
RAID0	x	RAID0	x+α	Capacity increased: equivalent to α HDDs
RAID0	1	RAID1	2	Capacity remains unchanged.
RAID0	x	RAID5	x+α	Capacity increased: equivalent to α-1 HDDs
RAID0	x	RAID6	x+α (α=2 or more)	Capacity increased: equivalent to α-2 HDDs
RAID1	2	RAID0	2+α	Capacity increased: equivalent to α+1 HDDs
RAID1	2	RAID5	2+α	Capacity increased: equivalent to α HDDs
RAID1	2	RAID6	2+α	Capacity increased: equivalent to α-1 HDDs
RAID5	x	RAID0	x+α	Capacity increased: equivalent to α+1 HDDs
RAID5	x	RAID5	x+α	Capacity increased: equivalent to α HDDs
RAID5	x	RAID6	x+α	Capacity increased: equivalent to α-1 HDDs
RAID6	x	RAID0	x+α	Capacity increased: equivalent to α+2 HDDs
RAID6	x	RAID5	x+α	Capacity increased: equivalent to α+1 HDDs
RAID6	x	RAID6	x+α	Capacity increased: equivalent to α HDDs

IMPORTANT: Note the following for the Reconstruction:

- Be sure to make backup copy of data and perform Consistency Check before starting Reconstruction.
- The Reconstruction is disabled in the configuration where several virtual disks are defined in one disk group
- During Reconstruction, the processing rate is decreased due to much load.
- The Reconstruction can be performed for the degraded or partially degraded virtual disk. However, it is recommended to execute Rebuild to recover the virtual disk, then execute Reconstruction.
- During Reconstruction, do not shutdown or reboot the server. If the server is shutdown by an unforeseen accident such as power interruption, turn on the power again as soon as possible. The Reconstruction is automatically restarted.
- In some configuration, Background Initialize may start automatically upon completion of Reconstruction.

Ex: Migration with addition for RAID5 virtual disk

The figure below shows an example of adding a single 36GB HDD to a RAID5 virtual disk configured with three 36GB HDDs.



Before Using WebBIOS

Read the following sections describing supported functions and precautions before using "WebBIOS".

Supported Functions

- Indication of model name and capacity of hard disk drive (called HDD hereafter)
- Indication of HDD allocation status
- Creation of virtual disk
  - Setting of RAID level
  - Setting of Stripe Block size
  - Setting of Read Policy/Write Policy/IO Policy
- Indication of configuration information and status of virtual disk
- Removal of virtual disk
- Clearing of configuration
- Execution of initialization
- Execution of Consistency Check
- Execution of manual rebuild
- Execution of reconstruction

Notes on Creating Virtual Disk

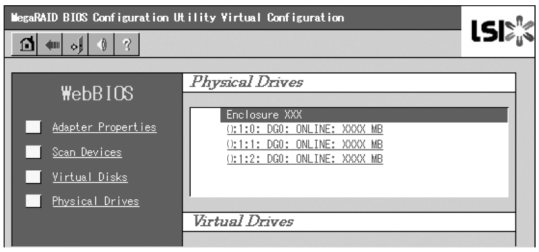
- The HDDs configuring the disk group should have the same capacity and rotation speed.
- Be sure to execute Consistency Check after creating VD.
- When installing an OS in VD under the Internal RAID Controller (equivalent to N8103-116), create a VD dedicated to OS installation.
- WebBIOS cannot be handled via remote console functions of NEC DianaScope.
- The physical drive numbers shown in WebBIOS and those shown in Universal RAID Utility are identified as follows.
  - WebBIOS

    Enclosure number and Slot number shown in Physical Drives box*

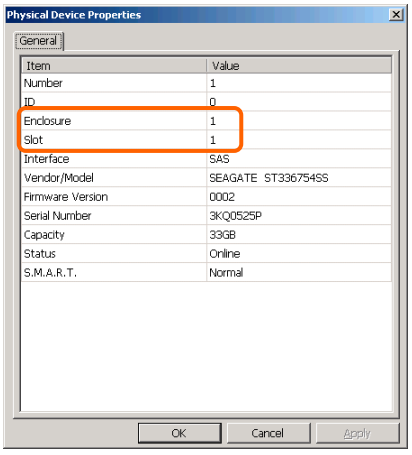
    * "X:X:X" shown in Physical Drives box represents Connector number:Enclosure number:Slot number. With this server, the Connector number is not supported, thus, it is always indicated as "()". The Enclosure Number is always "1". The Slot number represents a slot number of disk bay.
  - Universal RAID Utility

    Enclosure number and Slot number shown in Physical Device Properties

  Note that the slot numbers shown in Physical Drives box of WebBIOS are represented by numbers beginning with 0, but those in Universal RAID Utility are numbers beginning with 1.



Physical Drives View of WebBIOS

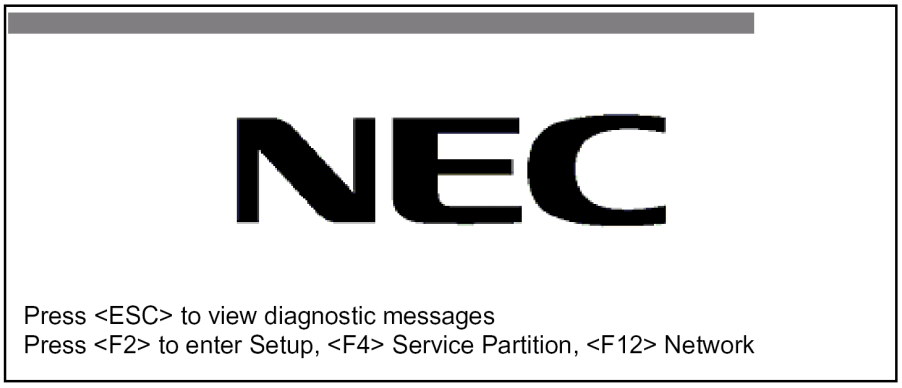


Property of Physical Device in Universal RAID Utility

Using WebBIOS

Starting WebBIOS

1. Press **Esc** when the screen as shown below appears after powered on the server.



2. Press **Ctrl** + **H** on POST screen to start WebBIOS.

POST screen image (with no virtual disk assigned)

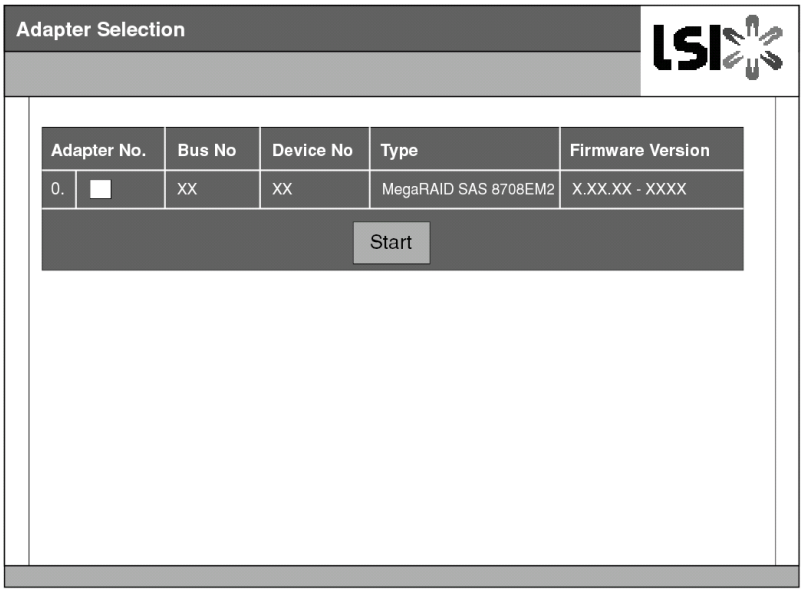
```
LSI MegaRAID SAS-MFI BIOS Version XXXX (Build MMM DD, YYYY)
Copyright (c) xxxx LSI Corporation
HA -X (Bus X Dev X) MegaRAID SAS PCI 8708EM2
FW package: X.X.X-XXXX

X Logical Drive(s) found on the host adapter.
X Logical Drive(s) handled by BIOS
Press <Ctrl> <H> for WebBIOS
```

IMPORTANT:

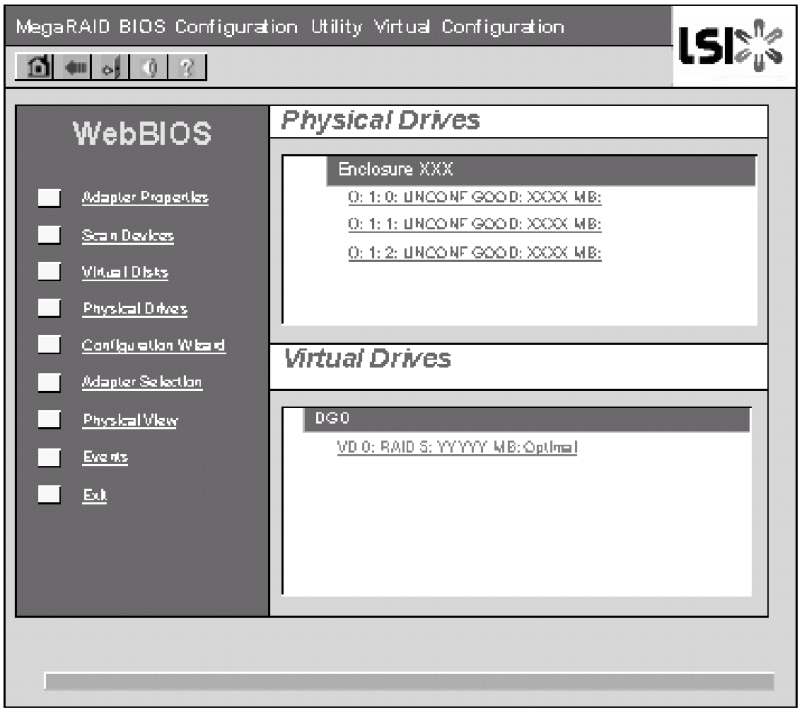
- Do not press unnecessary key such as **Pause** during POST.
- If you fail to press **Ctrl** + **H** and the system proceeds without displaying the WebBIOS main menu (shown on the next page), reboot the system, and press **Ctrl** + **H** on POST screen.

Main Menu

Shown below is [Adapter Selection] screen that appears first on WebBIOS. Select a controller to operate WebBIOS, and click [Start].



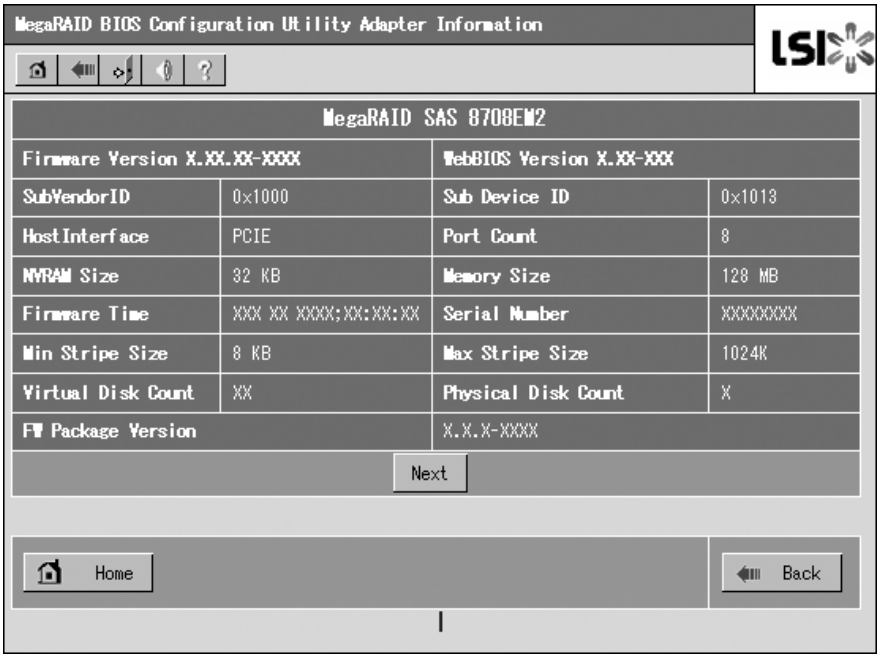
When the adapter is selected on [Adapter Selection], the WebBIOS Top Menu appears.



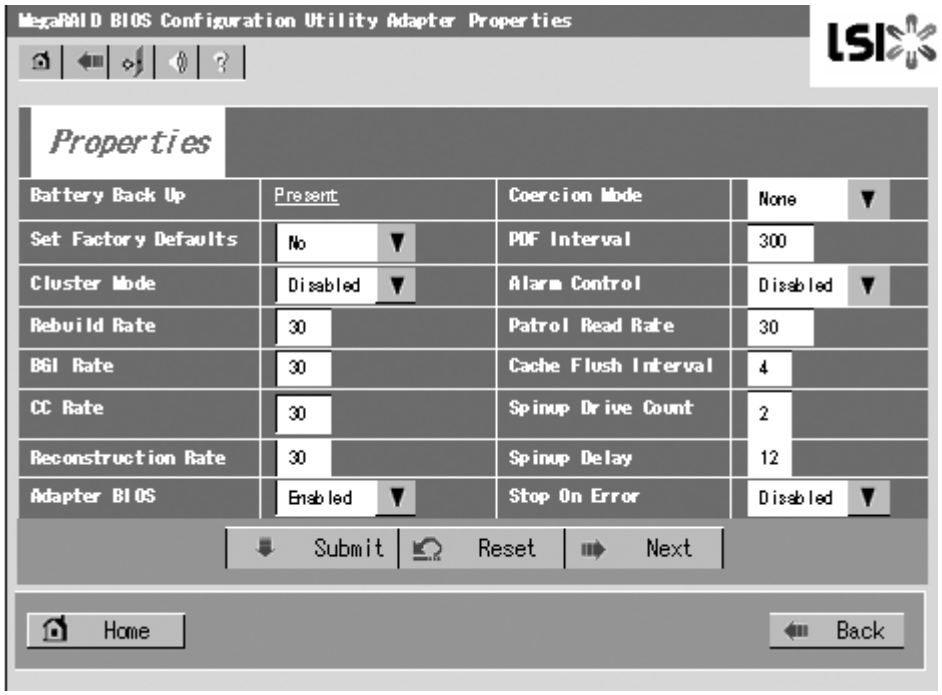
IMPORTANT: "X:X:X" shown in Physical Drives box represents Connector number:Enclosure number:Slot number. With this server, the Connector number is not supported, thus, it is always indicated as "()". The Enclosure number is always "1". The Slot number represents a slot number of disk bay.

Adapter Properties

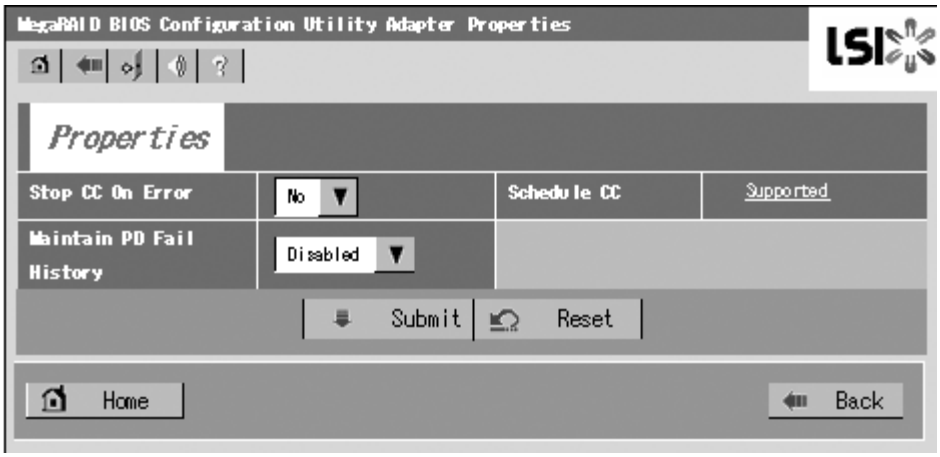
When you click [Adapter Properties] on WebBIOS Top Menu, the configuration information is displayed.



Click [Next] to see the detailed settings of this controller.



The detailed settings is continued to the next page. Click [Next] to view more information.



Default settings and their explanation

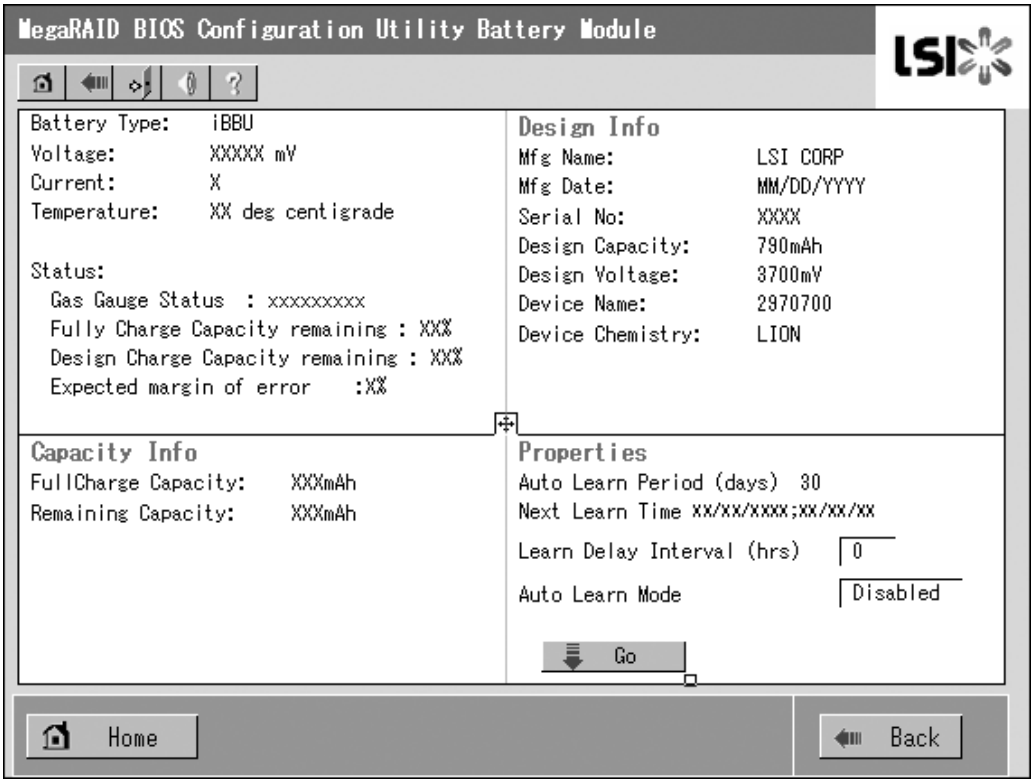
Item	Default	Description	Change
Battery Backup	Present None	Displays Properties. • When battery is installed: Present • When battery is not installed: None	–
Set Factory Defaults	[No] Yes	Restores vendor's factory defaults.	Prohibited *1
Cluster Mode	Disabled	–	Prohibited
Rebuild Rate	30	Recommended value: 30	Permitted
Patrol Read Rate	30	Recommended value: 30	Permitted
BGI Rate	30	Recommended value: 30	Permitted
CC Rate	30	Recommended value: 30	Permitted
Reconstruction Rate	30	Recommended value: 30	Permitted
Adapter BIOS	[Enabled] Disabled	–	Prohibited
Coercion Mode	[None] 128MB-way 1GB-way	–	Prohibited
PDF Interval	300	–	Prohibited
Alarm Control	[Disabled] Enabled Silence	Disabled: Does not issue an alarm.	Prohibited *2
Cache Flush Interval	4	–	Prohibited
Spinup Drive Count	2	–	Prohibited
Spinup Delay	12	–	Prohibited
StopOnError	[Disabled] Enabled	–	Prohibited
Stop CC On Error	[No] Yes	Specify the operation at error detection in Consistency Check. No: Recover and resume. Yes: Abort	Permitted
Maintain PD Fail History	[Disabled] Enabled	–	Prohibited
Schdule CC	Supported	Set the scheduled consistency check.	Permitted

*1 Do not perform "Set Factory Defaults". If performed, the NEC's factory-set value will no longer be restored.

How to change setting value

On [Adapter Properties] screen, change a parameter to desired value, and then click [Submit] at the center of the screen to determine the new value.

The status of "Battery Backup" is indicated as "Present". Clicking [Present] opens the Battery Status screen as shown below.



IMPORTANT: You cannot change values for "Auto Learn Period", "Next Learn Time", and "Learn Delay Interval".

NOTES:

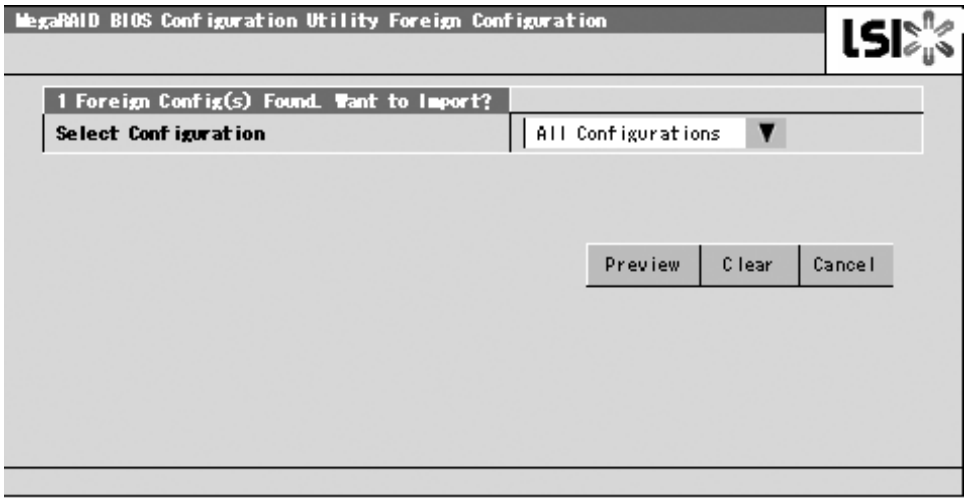
- Status field shows "Charging" when the battery is in charged status. It shows "Discharging" when the battery is in discharged status.
- When powering on the server after replaced the battery, the Status may not immediately change to "Charging". In that case, power on the server for several hours, and check "Status" again.

Scan Devices

When you click [Scan Devices] on WebBIOS Top Menu, the HDDs connected are detected again. Use this feature when you have installed a new HDD additionally while the WebBIOS is running.

IMPORTANT:

- If the newly connected HDD contains another configuration information, [Foreign Configuration] screen as shown below appears. To use the HDD as new one, click [Clear] to clear the configuration information in HDD.
- If you use Universal RAID Utility to configure a RAID system using the newly connected HDD containing another configuration information, first clear another configuration information using this Scan Devices feature.
  (*) Universal RAID Utility does not have this feature.



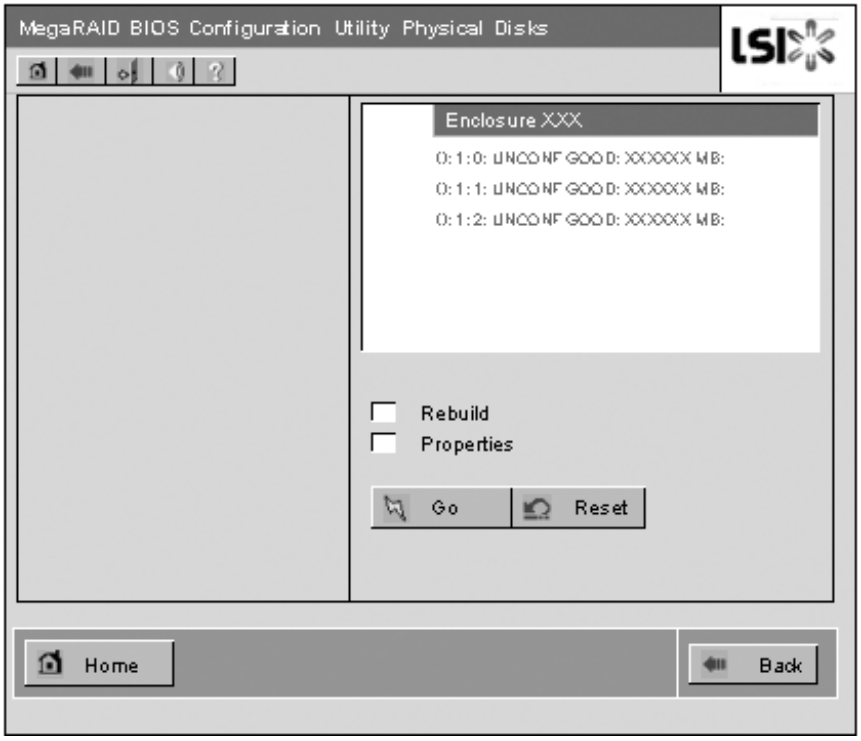
Virtual Disks

When you click [Virtual Disks] on WebBIOS Top Menu, the screen for operating the VD that has already been configured.

IMPORTANT: If no hard disk drive exists, the upper right column of the screen will be blank. Use this menu only when a hard disk drive exists.

Physical Drives

When you click [Physical Disks] on WebBIOS Top Menu, the screen for operating the physical drive (HDD) appears.

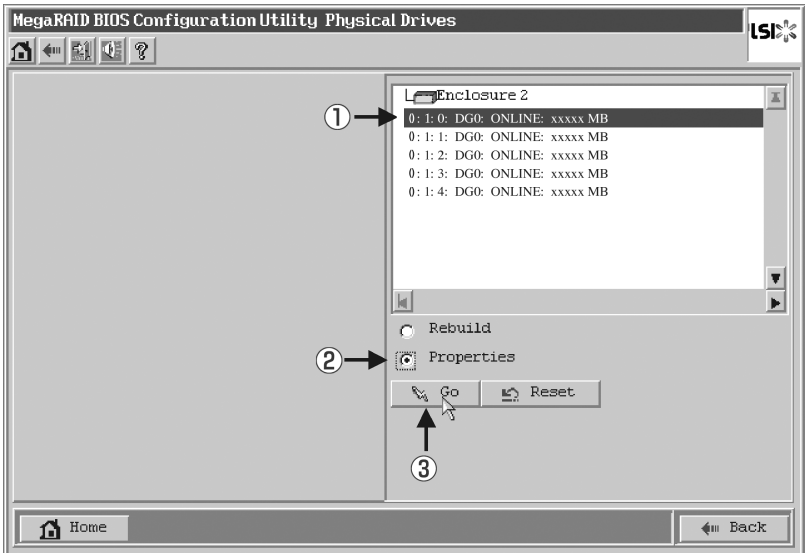


IMPORTANT: If no hard disk drive exists, the upper right column of the screen will be blank. Use this menu only when a hard disk drive exists.

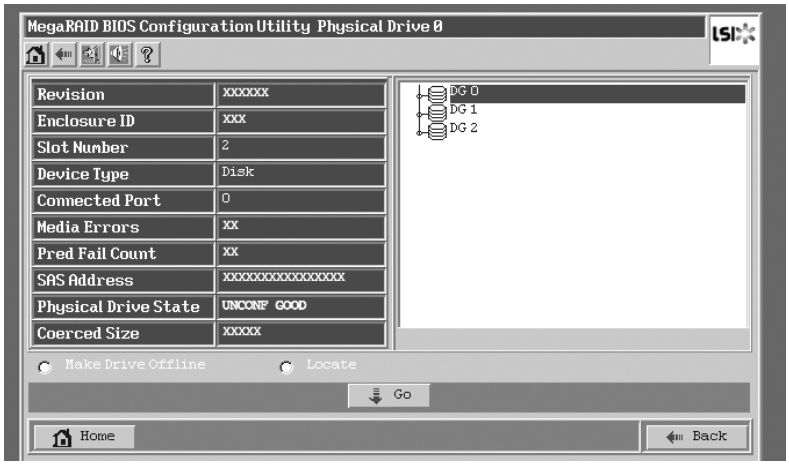
Physical Drives Properties

Take the following procedures to check Physical Drive Properties. Shown below is an example to check property of physical drive 0:0:0.

1. Click the Physical Drive you want to check.
2. Click the checkbox for [Properties].
3. Click [Go].



The Properties screen as shown below appears.



Configuration Wizard

Use this wizard to configure a RAID system using the HDDs connected. The detailed explanation of this feature is given in "Configuring Virtual Disk".

Adapter Selection

If optional RAID Controller (N8103-116/117) is installed in the server, you need to select an adapter controlled by WebBIOS to configure each adapter. Clicking [Adapter Selection] on WebBIOS top menu opens the [Adapter Selection] screen again.

Physical View / Logical View

If the virtual disk has been configured using the RAID Controller, DG (disk group) is displayed on WebBIOS Top Menu. Clicking [Physical View] displays information for HDDs in DG. Clicking [Logical View] displays virtual disk in DG.

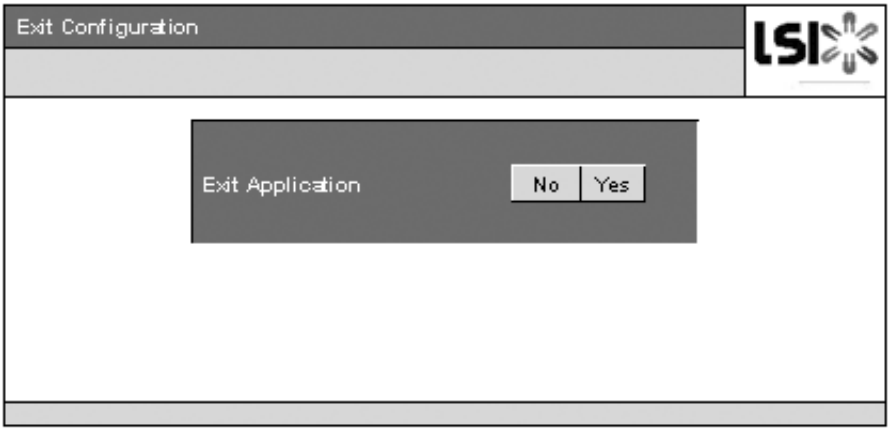
Events

The Events screen is used to confirm the system events.

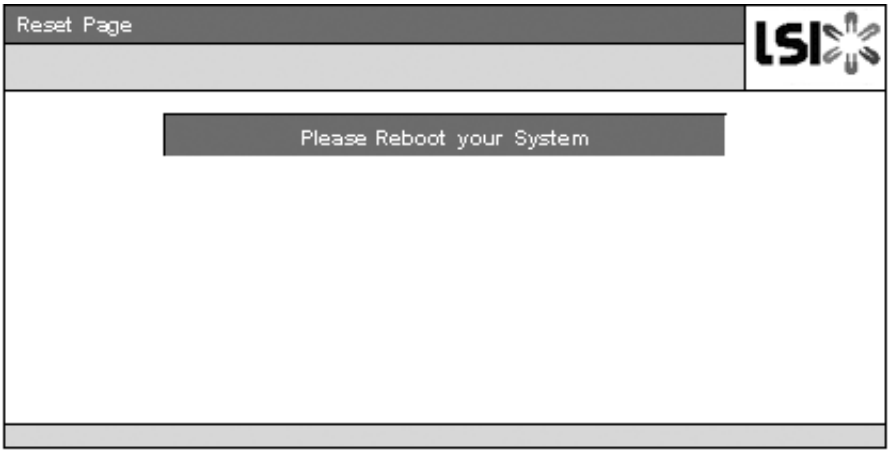
IMPORTANT: The Internal RAID Controller (equivalent to N8103-116) does not support Events feature.

Exit

When you click [Exit] on WebBIOS Top Menu, a confirmation screen to exit from WebBIOS is displayed. Click [Yes] to exit from WebBIOS.



The screen as shown below appears when WebBIOS is terminated. Restart the server.

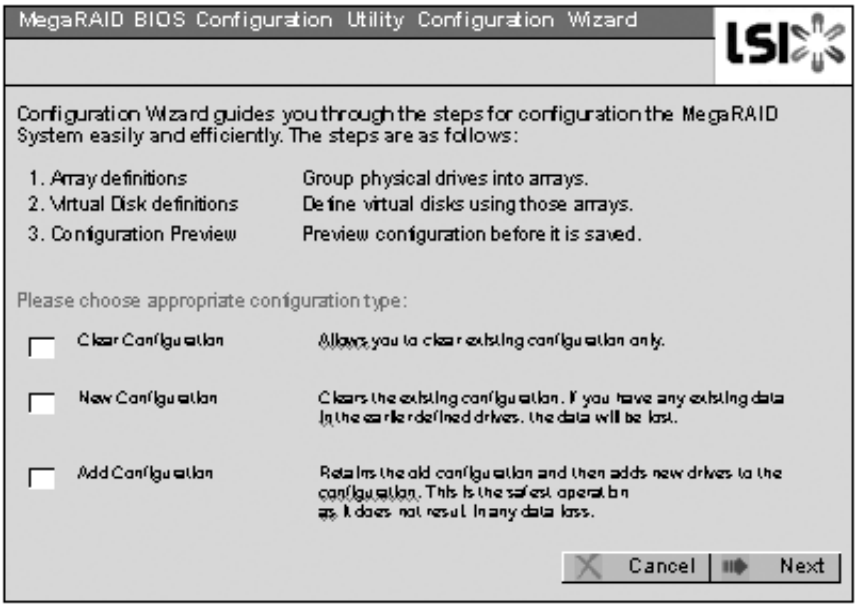


Configuring Virtual Disk

This section describes the procedures for configuration of VD (virtual disk) using WebBIOS.

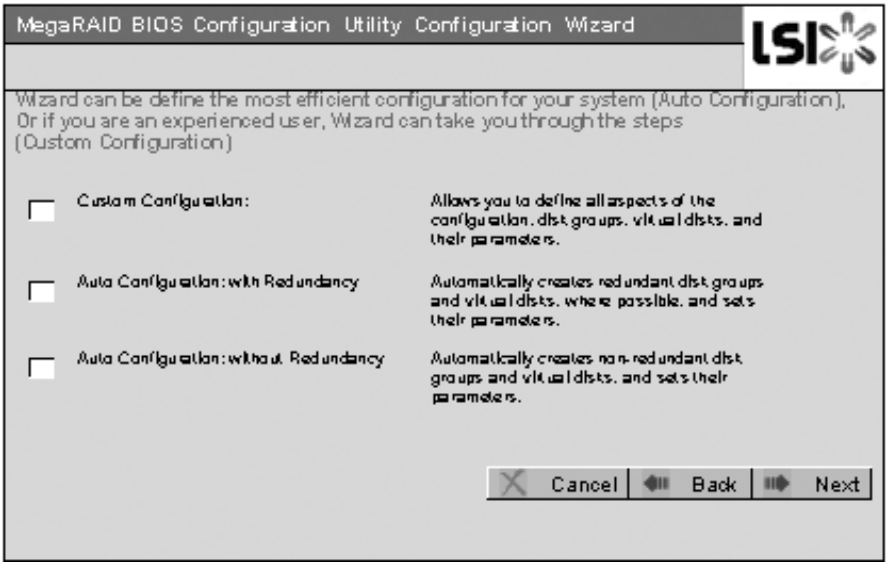
Configuration Wizard

When you click [Configuration Wizard] on WebBIOS Top Menu, the screen as shown below appears. Select the relevant operation, and click [Next] at lower right of the screen.


MegaRAID BIOS Configuration Utility Configuration Wizard
LSI
Configuration Wizard guides you through the steps for configuration the MegaRAID System easily and efficiently. The steps are as follows:
1. Array definitions
Group physical drives into arrays.
2. Virtual Disk definitions
Define virtual disks using those arrays.
3. Configuration Preview
Preview configuration before it is saved.
Please choose appropriate configuration type:
Clear Configuration
Allows you to clear existing configuration only.
New Configuration
Clears the existing configuration. If you have any existing data in the earlier defined drives, the data will be lost.
Add Configuration
Retains the old configuration and then adds new drives to the configuration. This is the safest operation as it does not result in any data loss.
Cancel
Next

Clear Configuration	Allows you to clear existing configuration.
New Configuration	Clears the existing configuration and creates a new VD. If you have any existing data in the earlier defined virtual disk, the data will be lost.
Add Configuration	Retains the old configuration and then adds new virtual disk.

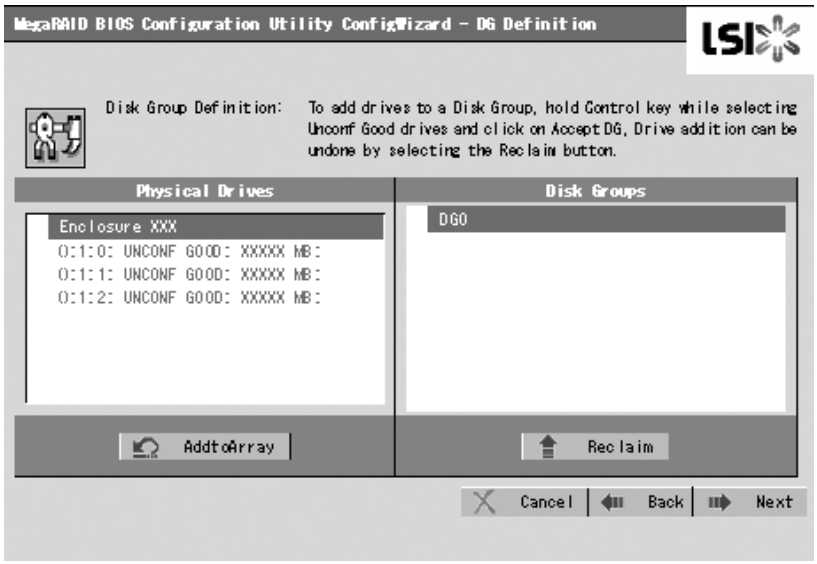
When you select [New Configuration] or [Add Configuration], the screen as shown below appears.


MegaRAID BIOS Configuration Utility Configuration Wizard
Wizard can be define the most efficient configuration for your system (Auto Configuration).
Or if you are an experienced user, Wizard can take you through the steps
(Custom Configuration)
Custom Configuration:
Allows you to define all aspects of the configuration, disk groups, virtual disks, and their parameters.
Auto Configuration: with Redundancy
Automatically creates redundant disk groups and virtual disks, where possible, and sets their parameters.
Auto Configuration: without Redundancy
Automatically creates non-redundant disk groups and virtual disks, and sets their parameters.
Cancel
Back
Next

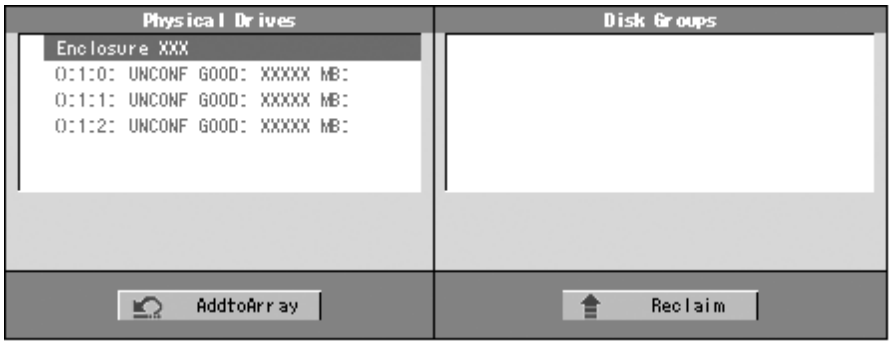
Custom Configuration:	Allows you to define all aspects of the configuration, RAID level, size, and others.
Auto Configuration with Redundancy:	Automatically creates redundant virtual disk.
Auto Configuration without Redundancy:	Automatically creates non-redundant virtual disk.

IMPORTANT: The Internal RAID Controller (equivalent to N8103-116) supports "Custom Configuration" only.

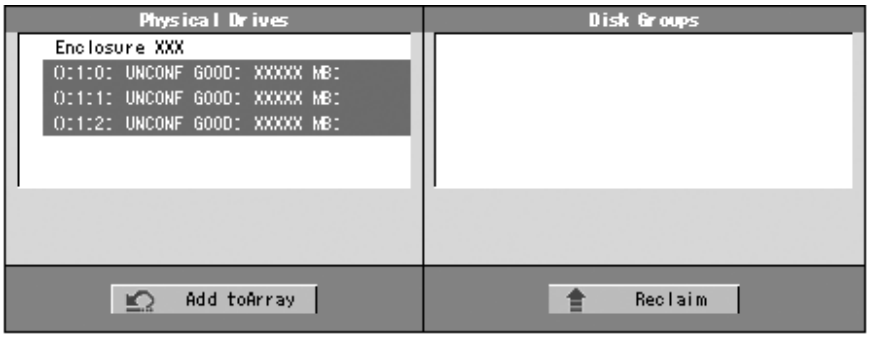
Use this menu to define several physical drives (PD) as a disk group (DG).


MegaRAID BIOS Configuration Utility ConfigWizard - DG Definition
Disk Group Definition:
To add drives to a Disk Group, hold Control key while selecting Unconf Good drives and click on Accept DG. Drive addition can be undone by selecting the Reclaim button.
Physical Drives
Disk Groups
Enclosure XXX
0:1:0: UNCONF GOOD: XXXXX MB:
0:1:1: UNCONF GOOD: XXXXX MB:
0:1:2: UNCONF GOOD: XXXXX MB:
DG0
Add to Array
Reclaim
Cancel
Back
Next

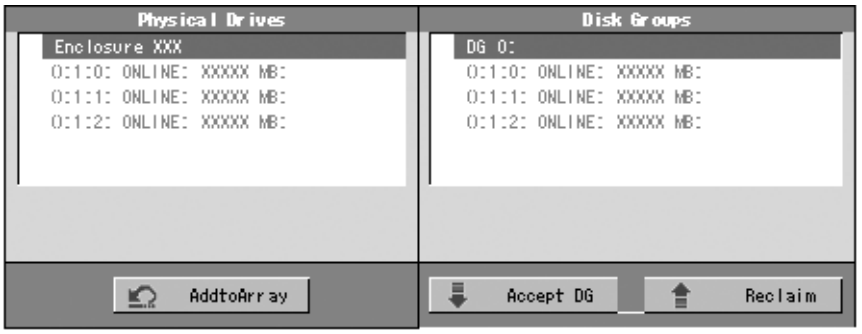
1. To add physical drives (HDD) to a Disk Group, hold **Ctrl** while selecting physical drives (HDDs) in DG.



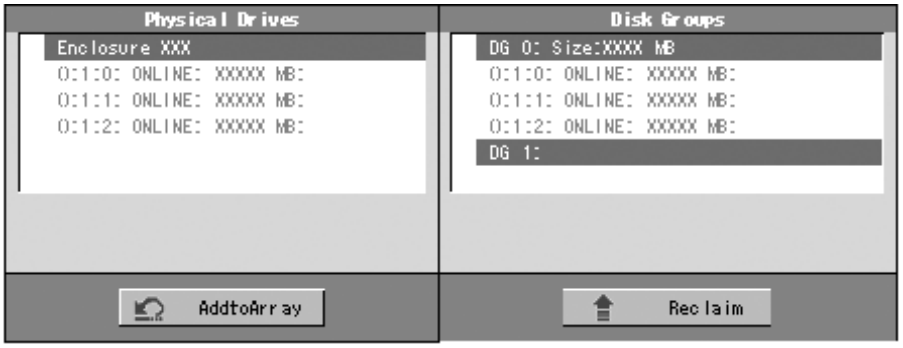
2. Upon completion of selection, click [Add to Array] at the lower left of the screen.



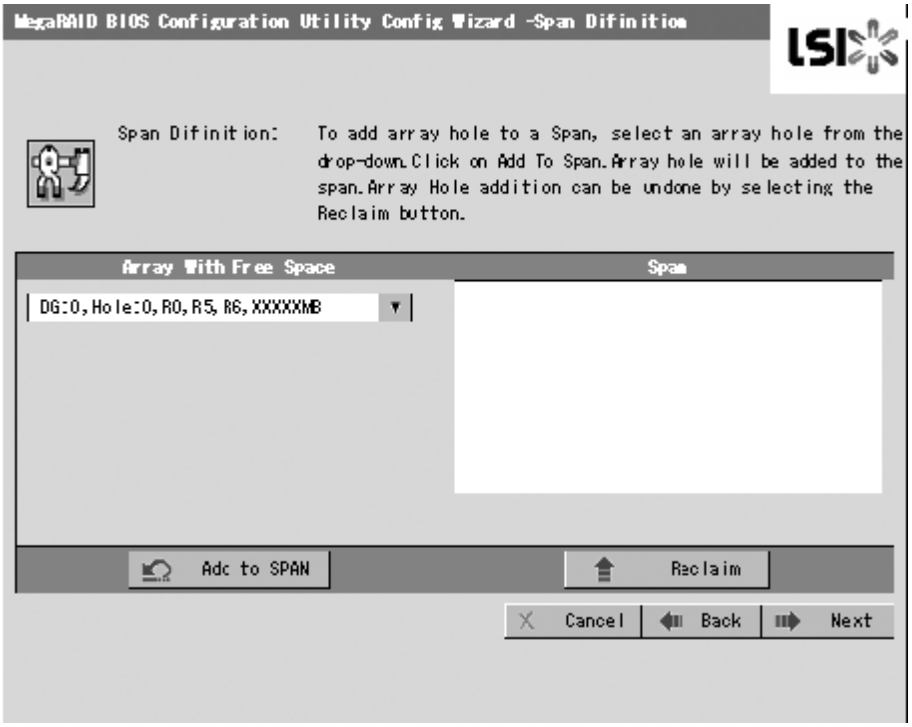
3. A new DG is defined in the Disk Groups frame. To define the new DG, click [Accept DG] at the lower right of the screen.



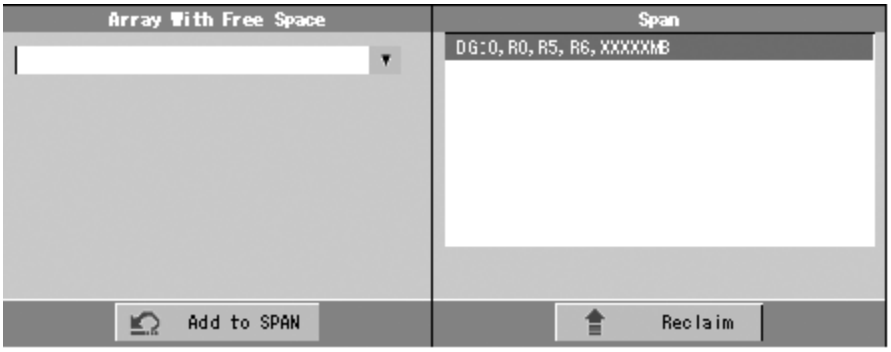
4. After the DG has been defined, click [Next] at the lower right of the screen.



5. Then, the Span Definition screen appears.


MegaRAID BIOS Configuration Utility Config Wizard -Span Difinition
LSI
Span Difinition:
To add array hole to a Span, select an array hole from the drop-down. Click on Add To Span. Array hole will be added to the span. Array Hole addition can be undone by selecting the Reclaim button.
Array With Free Space
Span
DG:0, Hole:0, R0, R5, R6, XXXXXMB
Adc to SPAN
Reclaim
Cancel
Back
Next

6. Select a DG to define VD from "Array With Free Space" frame, then click [Add to SPAN]. The DG is defined in the "Span" field to the right.

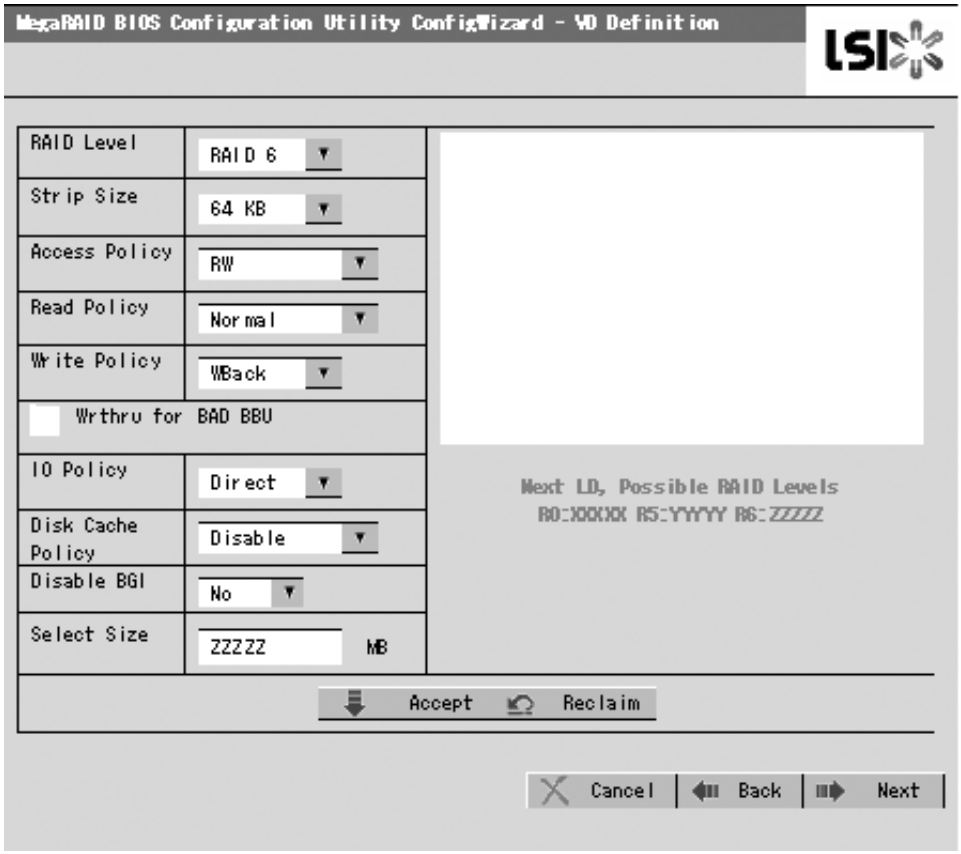


7. After the Span has been defined, click [Next] at the lower right of the screen.

IMPORTANT:

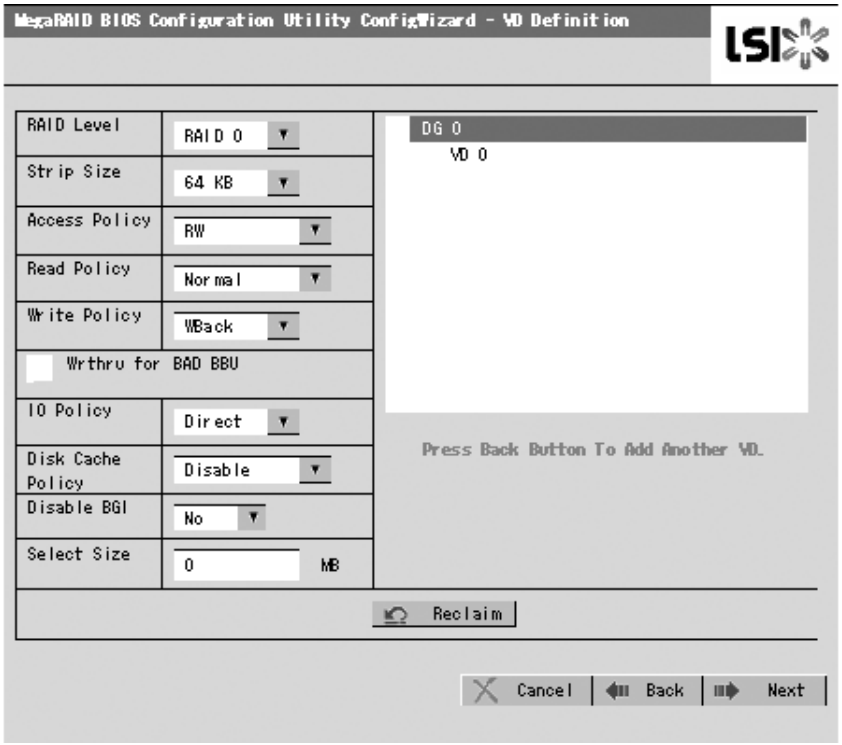
- To configure RAID0, 1, 5, or 6, perform Span Definition to a single DG only. If you need to perform Span Definition to several DGs, define VD for the first DG, then select the next DG to define VD.
- Span Definition cannot be performed to DGs containing the different number of HDDs.

Define the virtual disk (VD) in DG that has been created in previous step. When DG was defined, [VD Definition] screen is displayed. In the "Next LD, Possible RAID Levels" column, available RAID levels and maximum size for VD are displayed.



As an example, define a RAID5 VD of yyyyy MB.

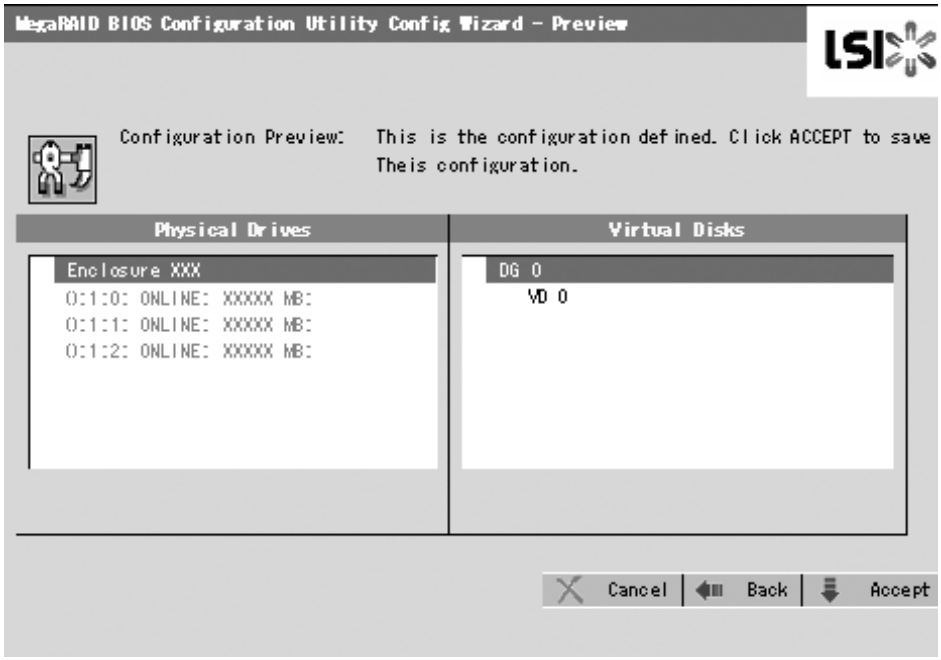
1. Specify the necessary parameters in left columns.
2. Enter "yyyyy" in "Select Size" field.
3. Click [Accept] at the lower center of the screen.
4. If you want to define another VD, click [Back] and repeat steps starting from Span Definition screen.
5. Upon completion of VD definition, click [Next].



IMPORTANT:

- The value shown in "Select Size" indicates the maximum size allowed for RAID1 or RAID6. You need to specify the maximum size for RAID0 or RAID5 according to "Next LD, Possible RAID Levels".
- To use RAID 5 or RAID 6 with Internal RAID Controller (equivalent to N8103-116), you need to additionally install the optional N8103-119 RAID Upgrade Kit.
- If N8103-119 RAID Upgrade Kit is not installed, do not select "RAID5" that may appear in [RAID Level] box. If selected, you will fail to save the configuration information. In such a case, you need to define a VD again from the beginning.

6. VD 0 is created in DG 0 as shown in the screen below.



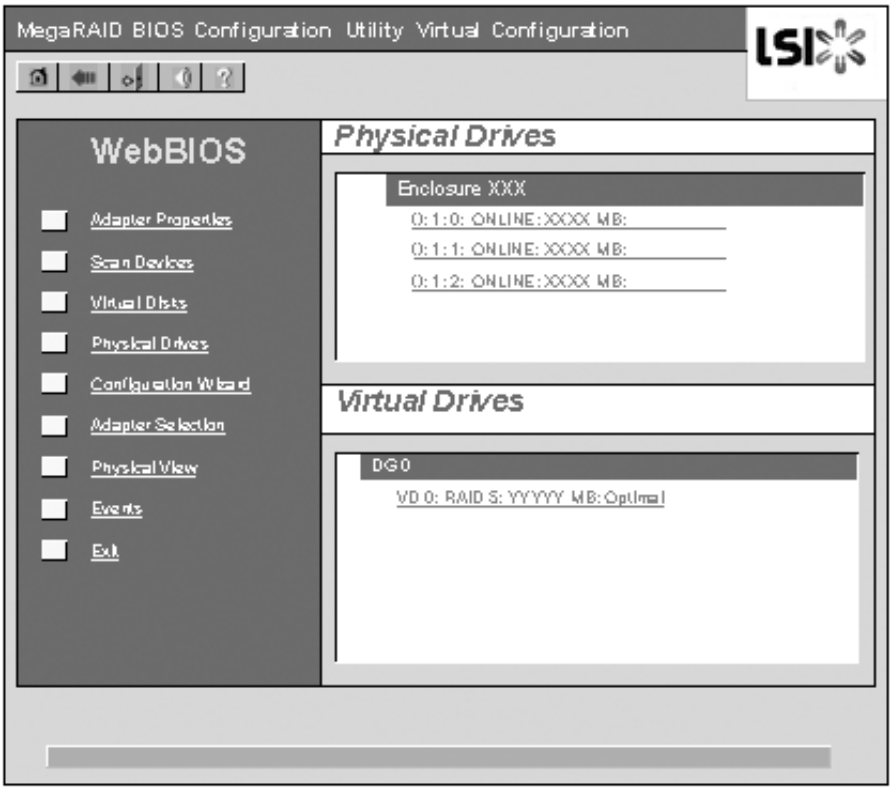
7. After making sure that the VD is created correctly, click [Accept] at the lower right of the screen.

8. The confirmation message "Save this Configuration?" appears. Click "Yes" to save the configuration.

9. The confirmation message "All data on the new Virtual Disks will be lost. Want to Initialize?" appears. Normally, select "Yes".

10. "Virtual Disks" operation screen is displayed. If no other operation is required, click [Home] at the lower left of the screen.

11. The WebBIOS Top Menu is displayed. Virtual Disk you have created is displayed in the lower right frame of the screen.

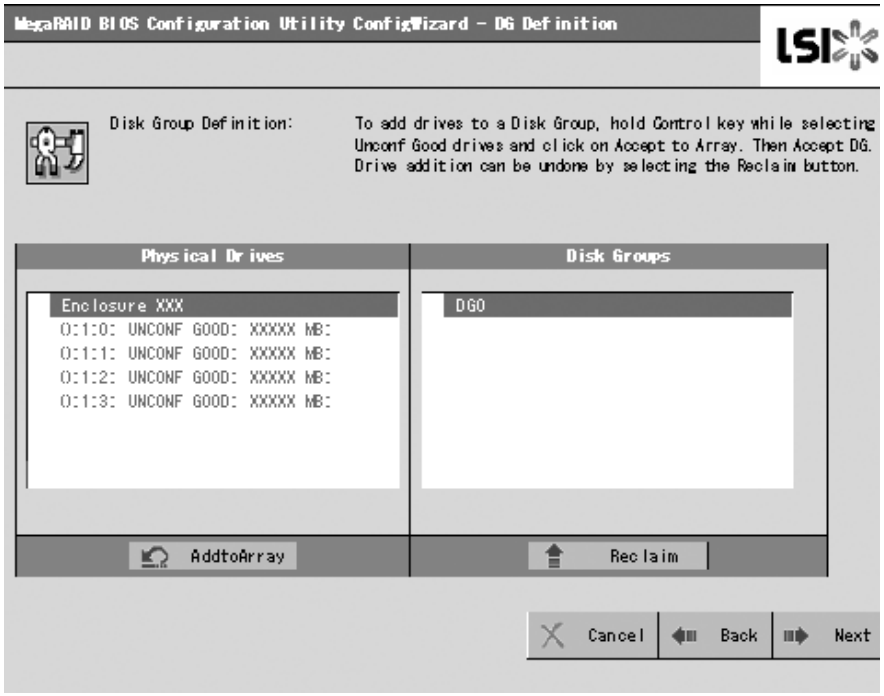


Configure SPAN

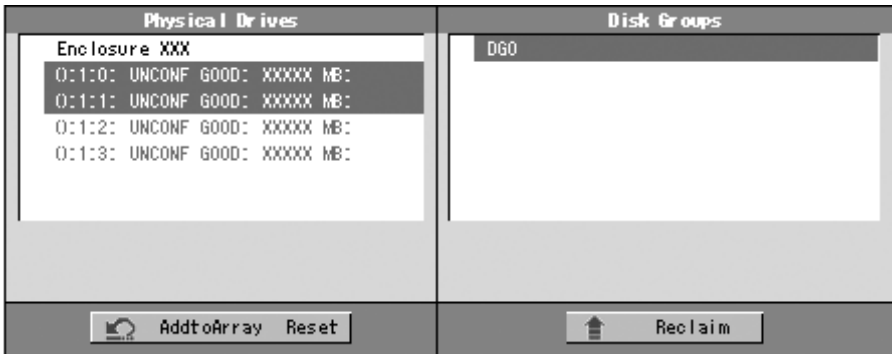
The following explains the sample procedure to configure RAID10 (spanning of RAID1) with four HDDs.

IMPORTANT: Do not attempt to configure RAID00 or RAID60. They are not supported.

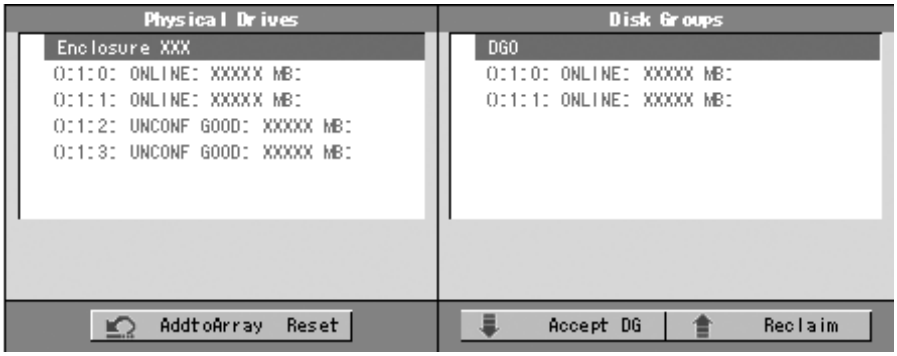
1. Click [Configuration Wizard] on WebBIOS Top Menu to start Wizard.


MegaRAID BIOS Configuration Utility ConfigWizard - DG Definition
LSI
Disk Group Definition:
To add drives to a Disk Group, hold Control key while selecting Unconf Good drives and click on Accept to Array. Then Accept DG. Drive addition can be undone by selecting the Reclaim button.
Physical Drives
Disk Groups
Enclosure XXX
0:1:0: UNCONF GOOD: XXXXX MB:
0:1:1: UNCONF GOOD: XXXXX MB:
0:1:2: UNCONF GOOD: XXXXX MB:
0:1:3: UNCONF GOOD: XXXXX MB:
DG0
AddtoArray
Reclaim
Cancel
Back
Next

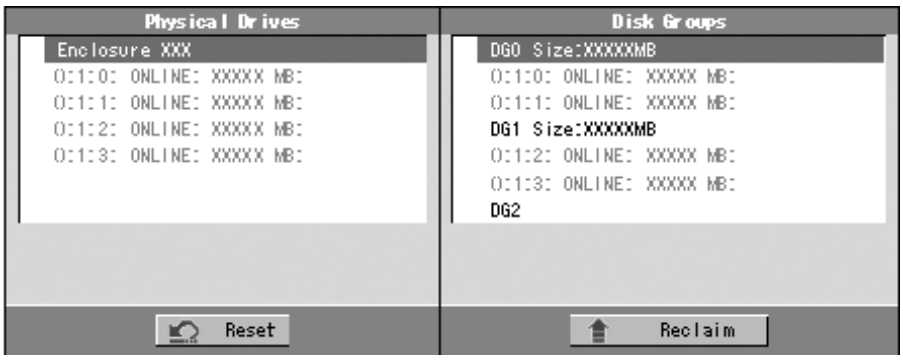
2. To add physical drives (HDD) to a Disk Group, hold **Ctrl** while selecting HDDs in DG. (In the example, two DGs will be configured and spanned.)



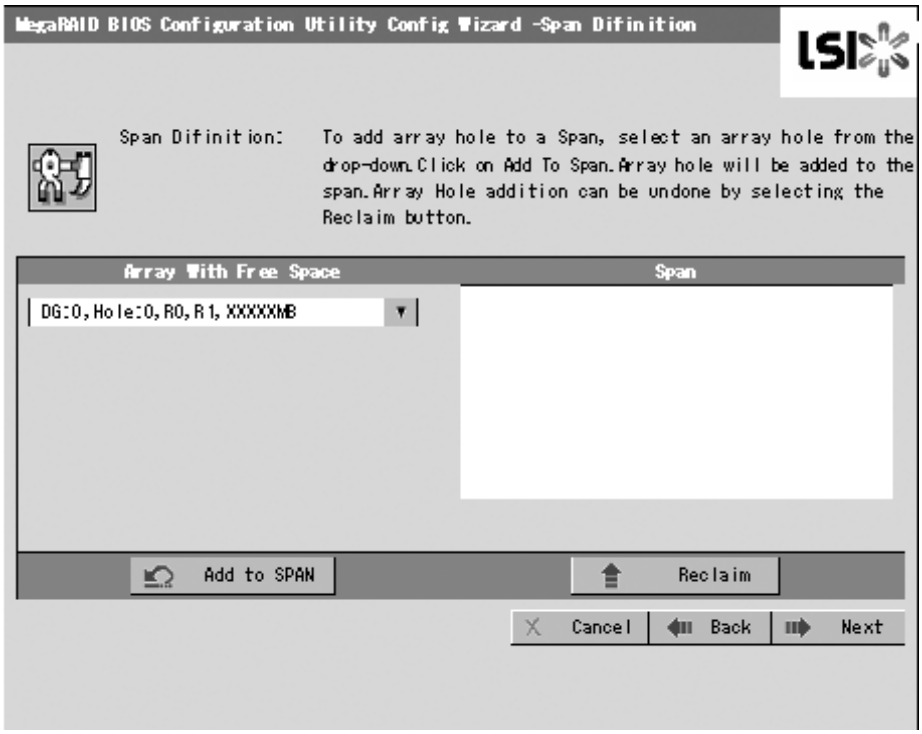
3. Upon completion of selection, click [Add to Array] at the lower right of the screen. After making sure that the new DG has defined in Disk Groups frame to the right, click [Accept DG].



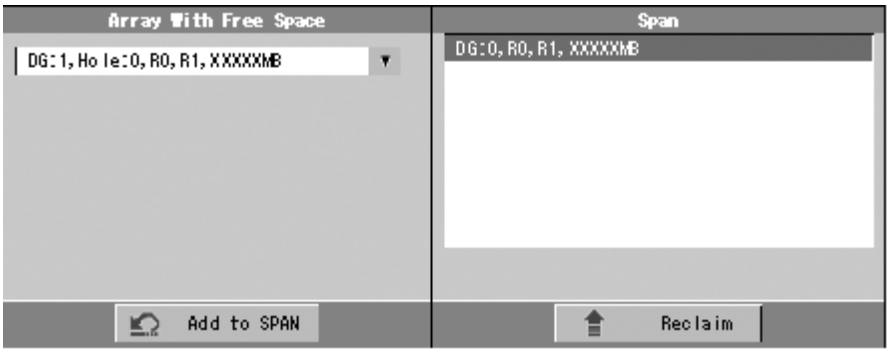
4. A new DG is defined in the Disk Groups frame. Define another DG in the similar procedures. After DGs have been defined, click [Next] at the lower right of the screen.



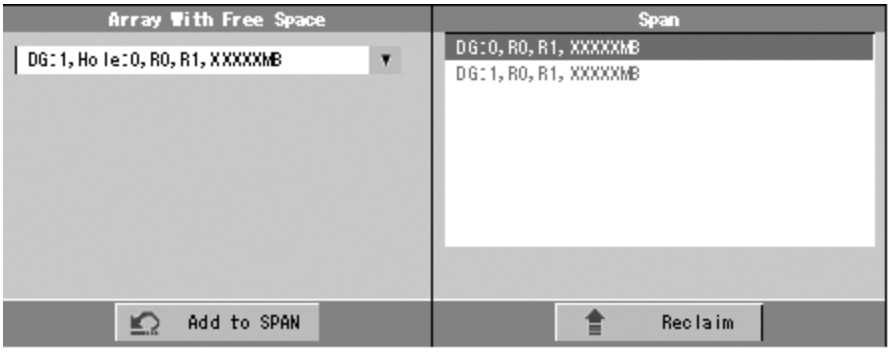
5. Configure RAID10 (spanning of RAID1) using the two DGs that have been created in previous step. When DGs were defined, [VD Definition] screen is displayed.


MegaRAID BIOS Configuration Utility Config Wizard -Span Difinition
LSI
Span Difinition:
To add array hole to a Span, select an array hole from the drop-down. Click on Add To Span. Array hole will be added to the span. Array Hole addition can be undone by selecting the Reclaim button.
Array With Free Space
Span
DG:0, Hole:0, R0, R1, XXXXXMB
Add to SPAN
Reclaim
Cancel
Back
Next

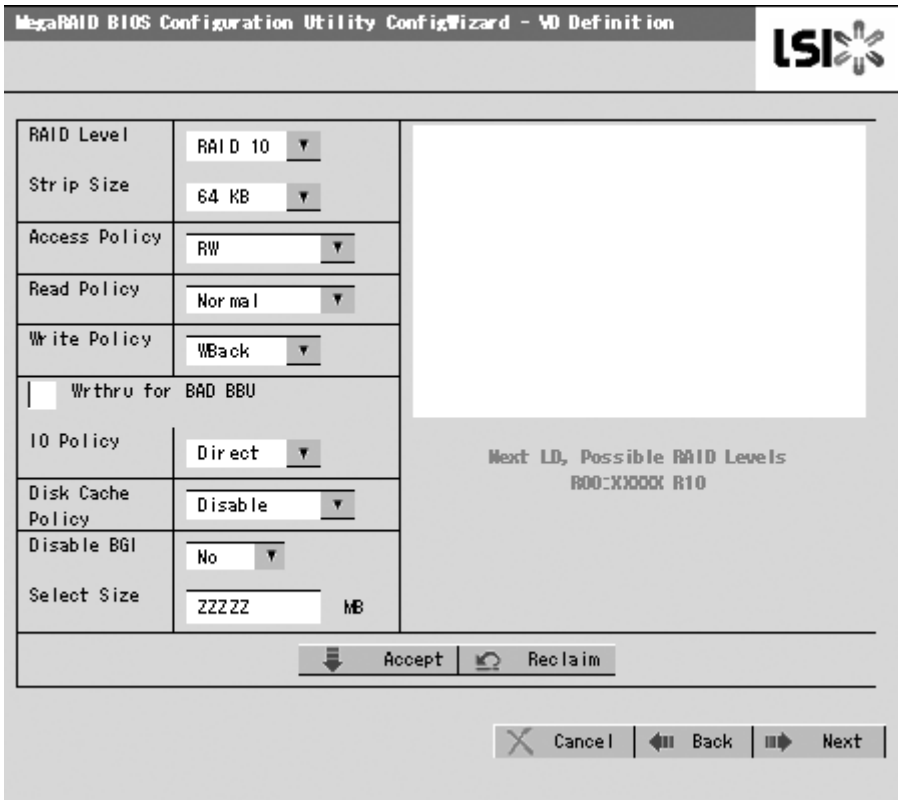
6. Select DG0 from "Array With Free Space" frame, then click [Add to SPAN]. The DG is defined in the "Span" field to the right.



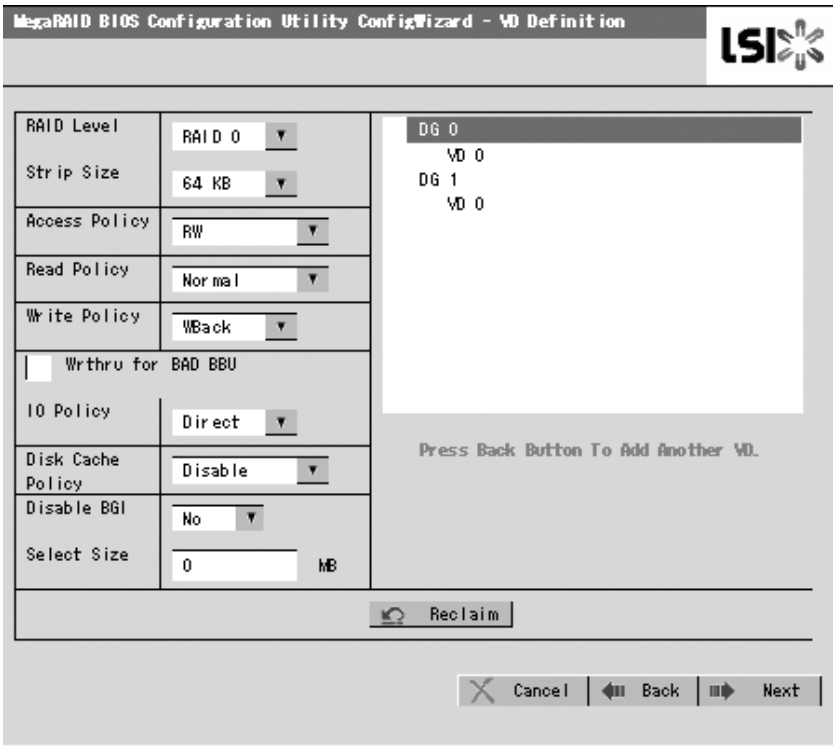
7. Then, select DG1 and click [Add to SPAN]. When the two DGs are defined in the "Span" field to the right, click [Next].



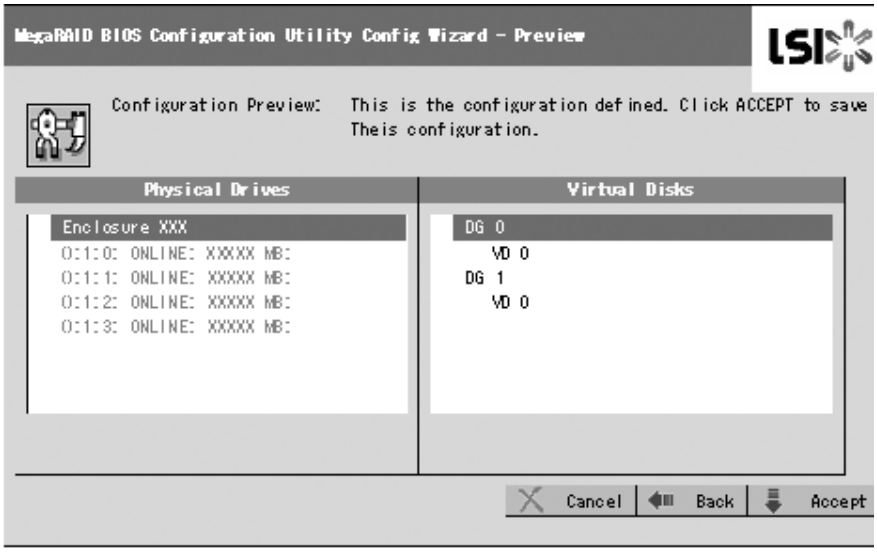
8. The VD Definition screen is displayed. Enter the necessary parameters, and click [Accept].



9. Make sure that both DG0 and DG1 are defined as VD 0, then click [Next] at the lower right of the screen.



10. On the "Preview" screen, make sure the VD is defined correctly, then click [Accept] at the lower right of the screen.



11. The confirmation message "Save this Configuration?" appears. Click "Yes" to save the configuration.
12. The confirmation message "All data on the new Virtual Disks will be lost. Want to Initialize?" appears. Normally, select "Yes".
13. "Virtual Disks" operation screen is displayed. If no other operation is required, click [Home] at the lower left of the screen.
14. The WebBIOS Top Menu is displayed. Virtual Disk you have created is displayed in the lower right frame of the screen.

Parameters for VD Definition

Listed below are parameters for Configuration Wizard.

Item	Parameter	Remarks
RAID Level	**RAID 0** / **RAID 1** / **RAID 5** / **RAID 6** / RAID 00 / RAID 10 / RAID 50 / RAID60	RAID 00, RAID 10, RAID 50, and RAID 60 are not supported.
Strip Size	8 KB / 16 KB / 32 KB / **64 KB** / 128 KB / 256 KB / 512 KB / 1024 KB	Recommended value: 64KB
Access Policy	**RW** / Read Only / Blocked	Recommended value: RW
Read Policy	**Normal** / Ahead / Adaptive	Recommended value: Normal
Write Policy	**WBack** / **WThru**	WBack: WriteBack WThru: WriteThru
WrtThru for BAD BBU	**Checked** / Unchecked	Select a mode when WriteBack is specified for Write Policy. Checked: Normal WriteBack Unchecked: Constant WriteBack Recommended value: Checked
IO Policy	**Direct** / Cached	Recommended value: Direct
Disk Cache Policy	NoChange / Enable / **Disable**	Recommended value: Disable
Disable BGI	**No** / Yes	Specify whether to perform Background Initialize after creation of VD. Recommended value: No

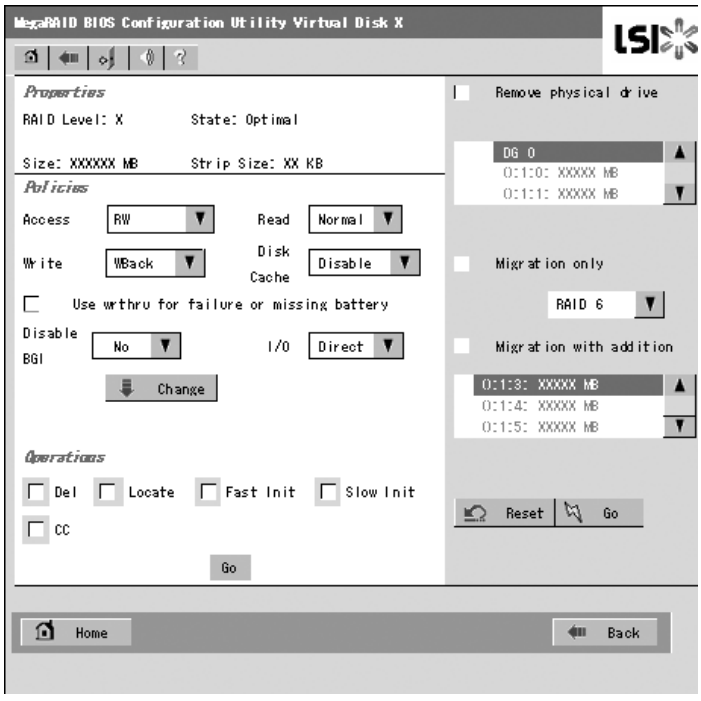
IMPORTANT:

- BGI (Back Ground Initialize) is available only for RAID5 VD configured with five or more HDDs.
- To use RAID 5 or RAID 6, with Internal RAID Controller (equivalent to N8103-116), you need to additionally install the optional N8103-119 RAID Upgrade Kit.
- If N8103-119 RAID Upgrade Kit is not installed, do not select "RAID5" that may appear in [RAID Level] box. If selected, you will fail to save the configuration information. In such a case, you need to define a VD again from the beginning.

The Write Policy has the following modes depending on combination with WrtThru for BAD BBU. Select a mode suitable for your environment.

		WrtThru for BAD BBU	
		Checked	**Unchecked**
Write Policy	WBack	Normal write back mode (recommended) This mode is available only when N8103-120F RAID Battery Backup Unit is installed. The controller uses cache memory for writing. However, if the battery is being charged or failed, the controller operates in WThru (write through) mode automatically. Thus, this mode can provide higher data security.	Constant write back mode This mode is available even if N8103-120F RAID Battery Backup Unit is not installed. The controller always uses cache memory for writing. In this mode, the data in cache memory may not be protected from being damaged if the power failure occurs due to charge/discharge or defect of the battery. Be sure to use UPS when specifying this mode for write policy.
	WThru	Write through mode This mode is recommended when N8103-120F RAID Battery Backup Unit is not installed. The controller does not use cache memory for writing data.	* This mode is unavailable. If you do not check "WrtThru for BAD BBU" at creation of VD, this item is automatically checked after the VD has been created.

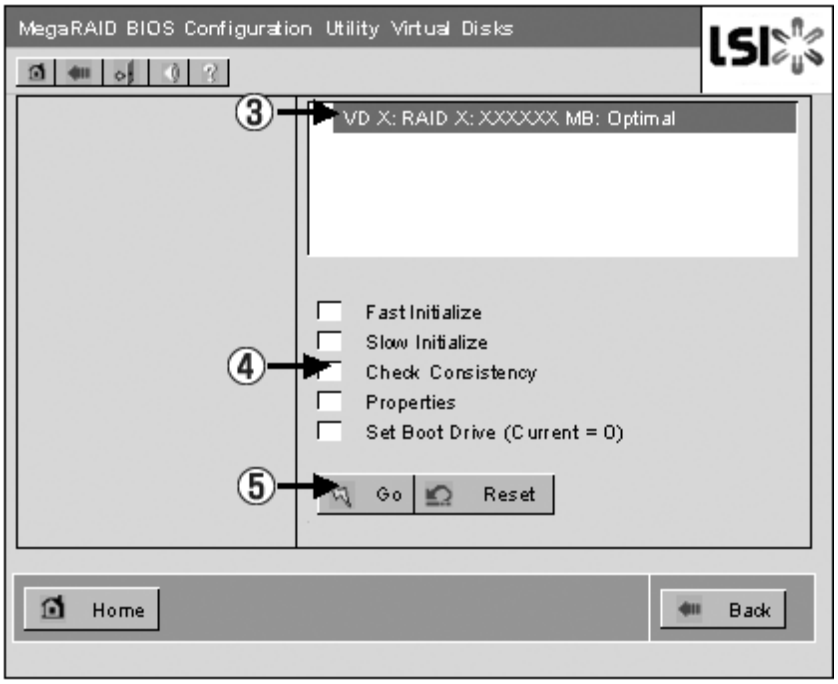
You can change parameters for VD definition except for RAID level and Stripe Size. On the WebBIOS Top Menu, click [Virtual Disks] and specify parameters in "Policies" frame, then click [Change].



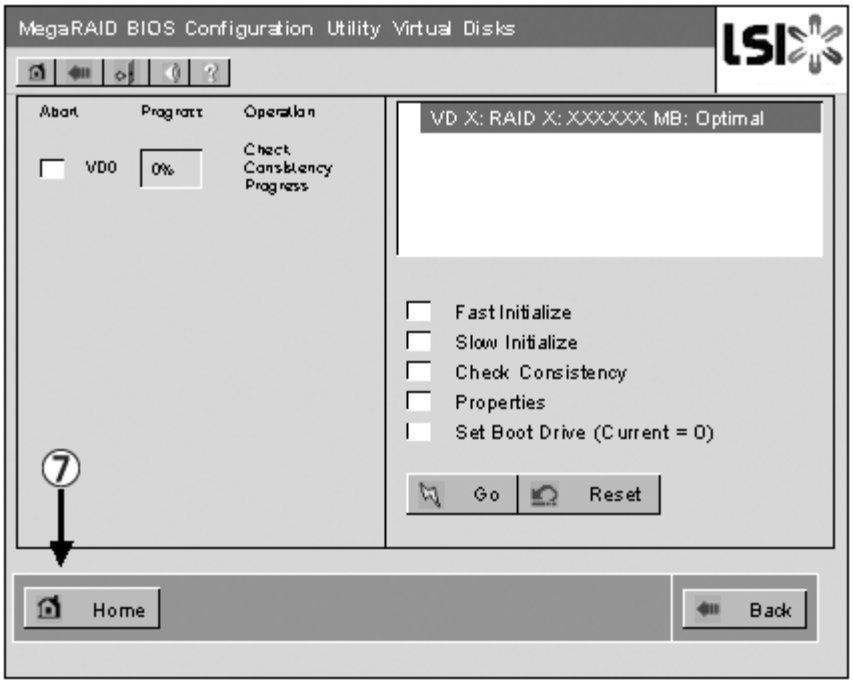
Operation of Various Features

Check Consistency

1. Start WebBIOS.
2. Click [Virtual Disks] on WebBIOS Top Menu.
3. Select a VD to perform Check Consistency from the upper right frame of Virtual Disks screen.
4. Click the checkmark column for Check Consistency from the lower right frame of Virtual Disks screen.
5. Make sure that Check Consistency is checked, and click [Go].



6. The progress of Check Consistency is displayed on the left frame of Virtual Disks screen.
7. Click [Home] at the lower left of Virtual Disks screen to return to the Top Menu.



IMPORTANT: Click [Home] while the background task such as Consistency Check, Rebuild, or Reconstruction is being executed. With the progress indication being displayed, the background task may be processed at slow rate.

Manual Rebuild

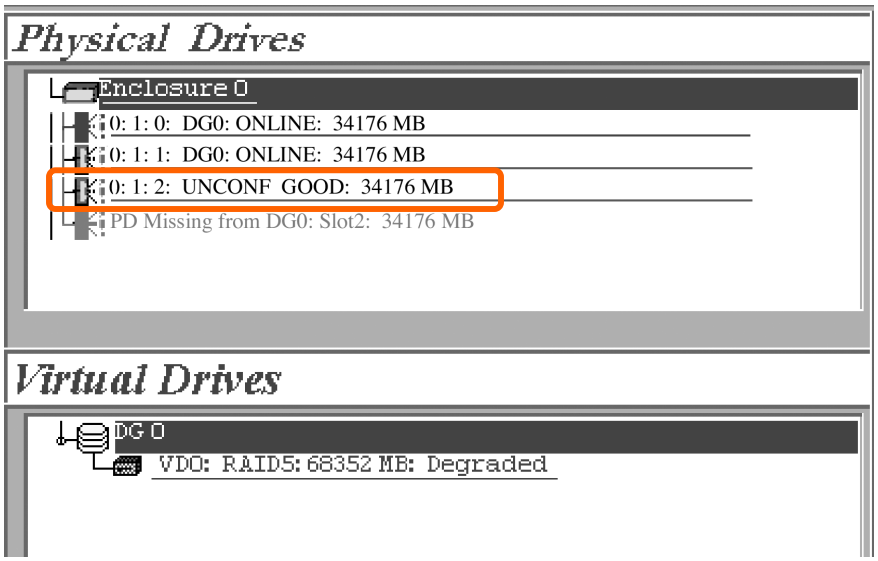
Described below are procedures based on assumption:
One of the HDDs failed in a RAID5 virtual disk configured with three HDDs.

Replace the failed HDD with new one after turning off the power of the server. Auto Rebuild feature is disabled for non-hot-swap replacement. Use Manual Rebuild feature to recover the virtual disk as described below.

1. Start WebBIOS.

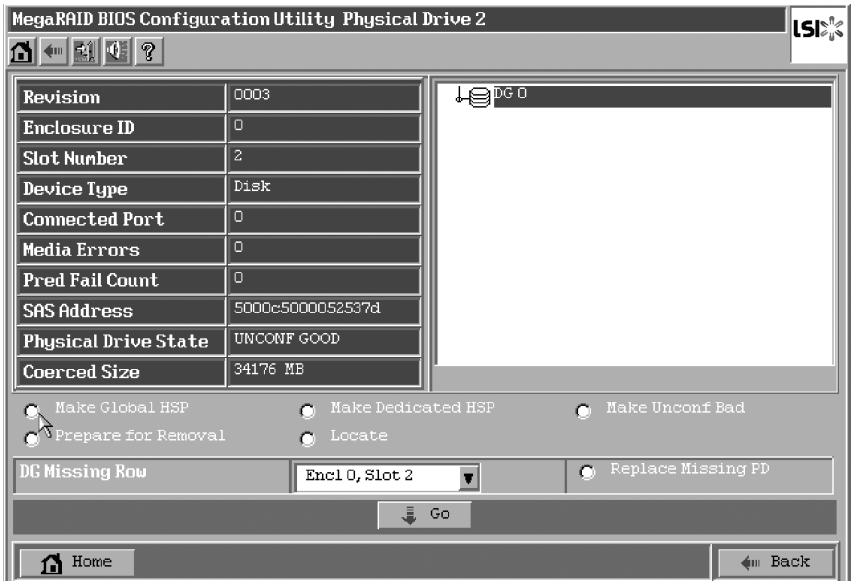
   Make sure that the status for the replaced HDD is indicated as "UNCONF GOOD" in the right frame of the Top Menu.

   In the example below, the hard disk drive in slot number 2 has been replaced.
   The indication "PD Missing from DGx: Slot 2: xxxxx MB" represents that the PD (physical drive) having been installed in slot number 2 was removed.

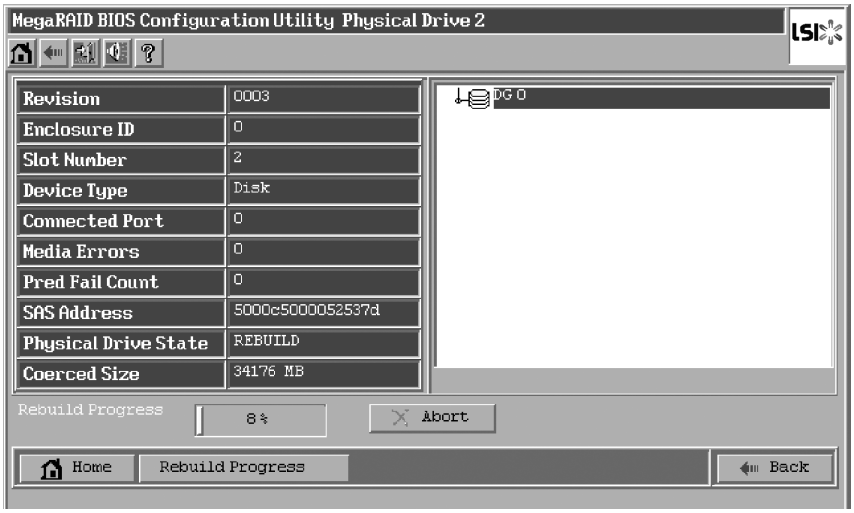

Physical Drives
Enclosure 0
0: 1: 0: DG0: ONLINE: 34176 MB
0: 1: 1: DG0: ONLINE: 34176 MB
0: 1: 2: UNCONF GOOD: 34176 MB
PD Missing from DG0: Slot2: 34176 MB
Virtual Drives
DG 0
VD0: RAID5: 68352 MB: Degraded

2. Select "():1:2" (newly connected HDD) in [Physical Drives].
3. The properties for Physical Drive is displayed.

4. Select "Make Global HSP" or "Make Dedicated HSP" on the lower part of the screen, and then click [Go] on the lower center of the screen.



5. When [Rebuild Progress] is displayed, click [Home] at the lower left of the screen to go back to WebBIOS Top Menu.



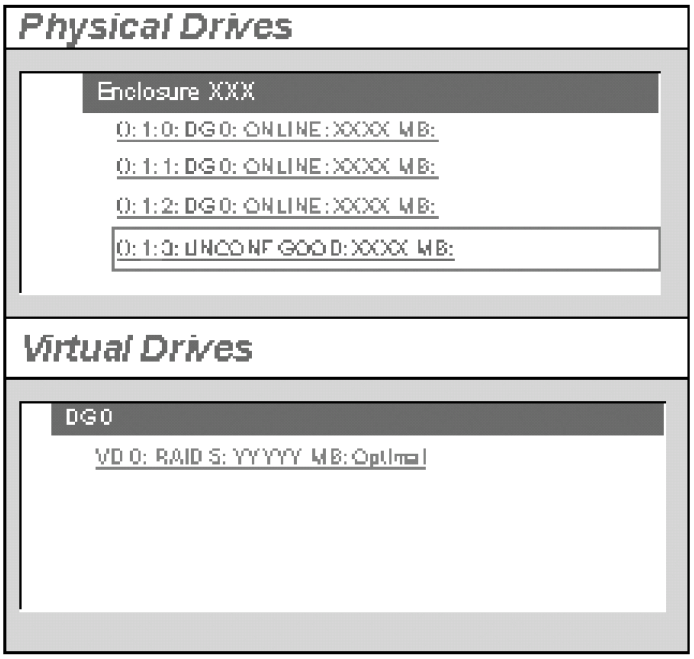
IMPORTANT: Click [Home] while the background task such as Consistency Check, Rebuild, or Reconstruction is being executed. With the progress indication being displayed, the background task may be processed at slow rate.

Setting Hot Spare

Described below are procedures based on assumption:
Add a HDD to a RAID5 virtual disk configured with three HDDs and assign a newly added HDD as Hot Spare.

1. Start WebBIOS.

   Make sure that the status for the added HDD is indicated as "UNCONF GOOD" in the right frame of the Top Menu.

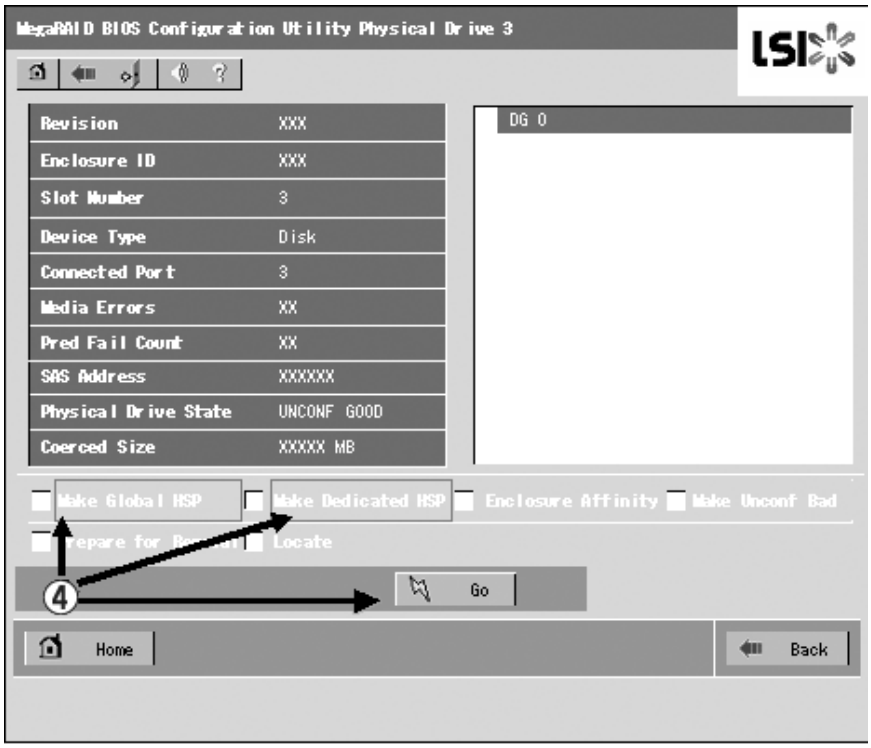

Physical Drives
Enclosure XXX
0: 1: 0: DG 0: ONLINE: XXXX MB:
0: 1: 1: DG 0: ONLINE: XXXX MB:
0: 1: 2: DG 0: ONLINE: XXXX MB:
0: 1: 3: UNCONF GOOD: XXXX MB:
Virtual Drives
DG 0
VD 0: RAID 5: YYYY MB: Optimal

2. Select "():1:3" (newly connected HDD) in [Physical Drives].
3. The properties for Physical Drive is displayed.

4. Select [Make Global HSP] or [Make Dedicated HSP] on the lower right of the screen, and then click [Go] on the lower center of the screen.

Global HSP: Indicates the Hot Spare available for all DGs.

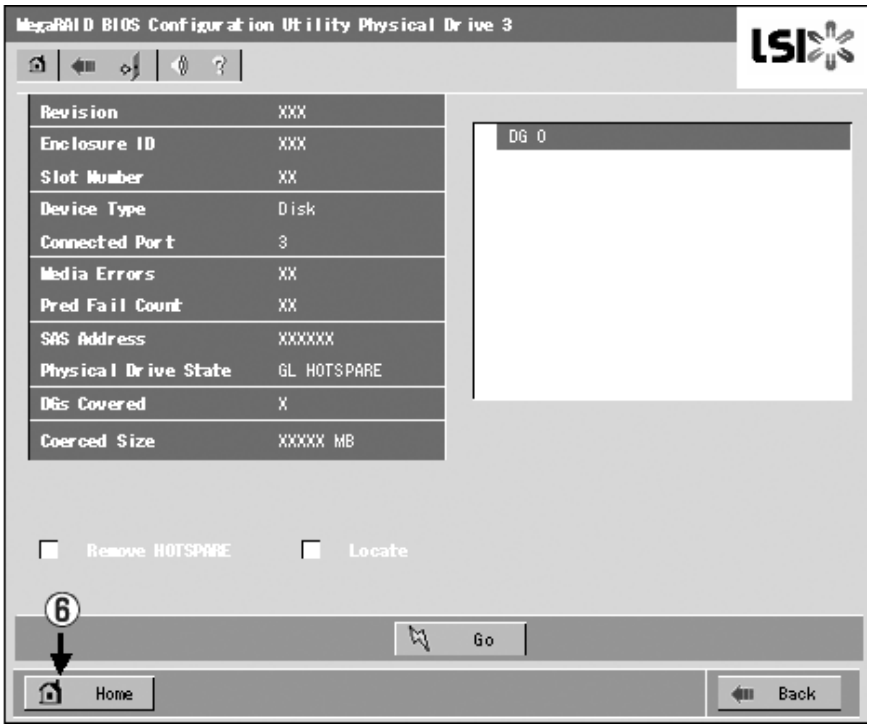
Dedicated HSP: Indicates the Hot Spare available only for the specific DG. You need to specify the target DG.



NOTE: Do not check "Enclosure Affinity" which defines the hot-spare to the specific enclosure. This setting is not supported in the system.

5. The status for the newly connected HDD changes to "HOTSPARE".

6. Click [Home] at the lower left of the screen to go back to WebBIOS Top Menu.

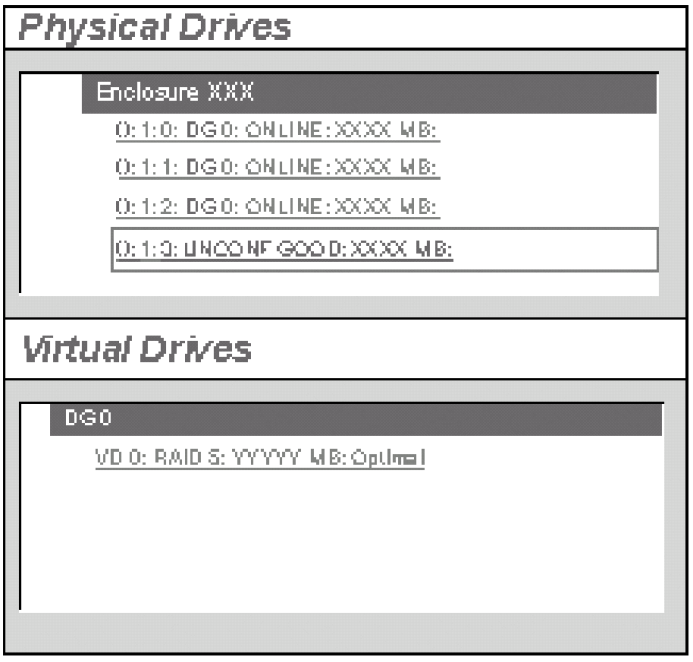


Reconstruction

Described below are procedures based on assumption:
Add a HDD to a RAID5 virtual disk configured with three HDDs to make a RAID5 virtual disk configured with four HDDs.

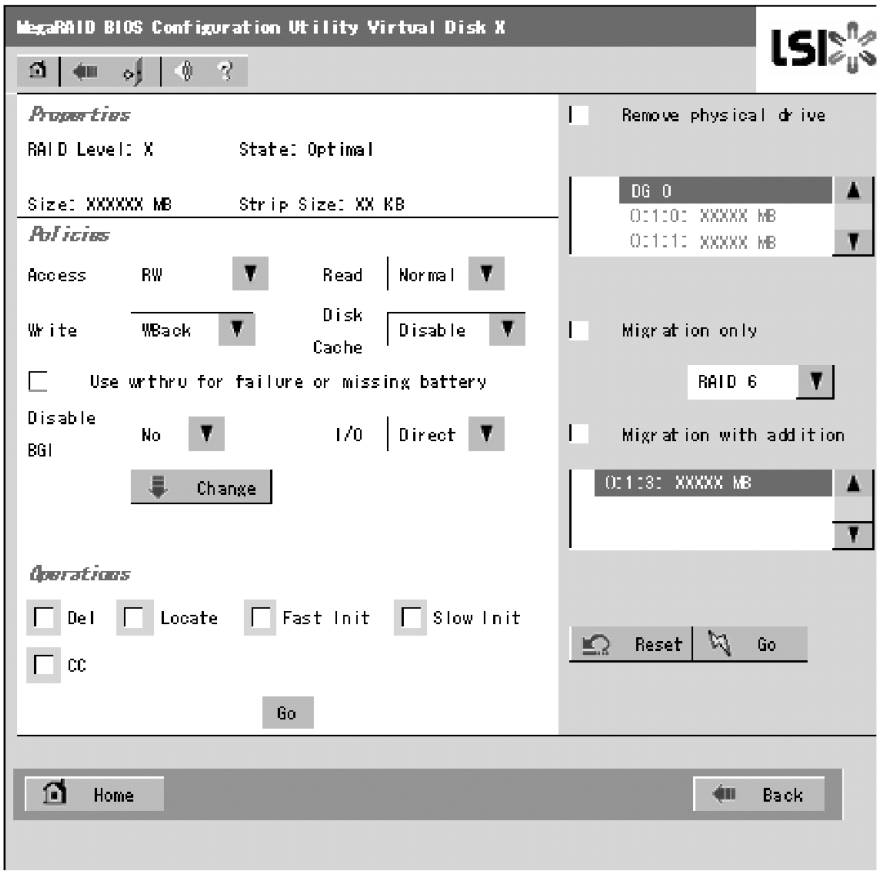
1. Start WebBIOS.

   Make sure that the status for the added HDD is indicated as "UNCONF GOOD" in the right frame of the Top Menu.

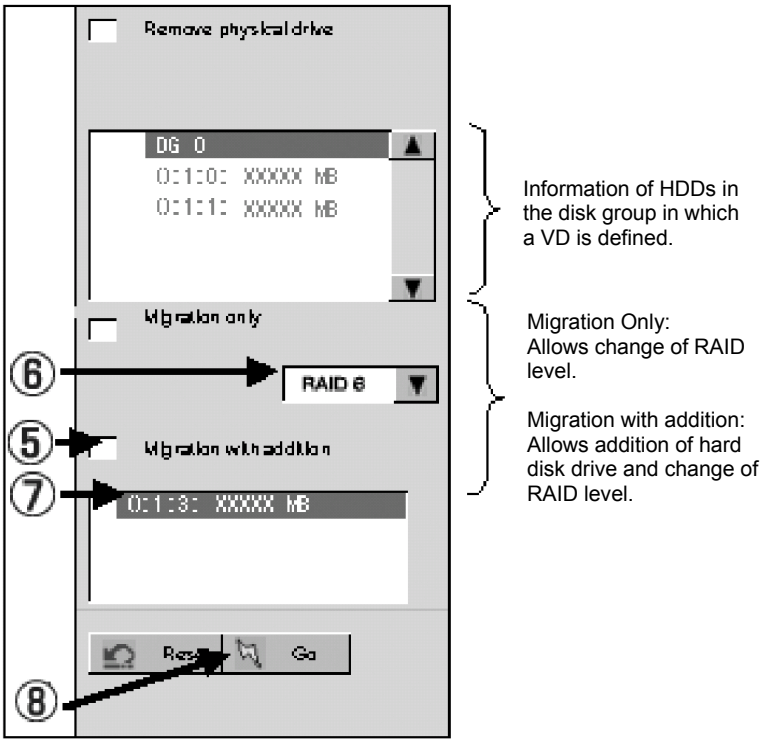


2. Select "VD 0" (already been constructed) in [Virtual Drives].

3. Setting menu for VD 0 is displayed.



4. On the right of the screen, items required for reconstruction are displayed.


Remove physical drive
DG 0
0:1:0: XXXXX MB
0:1:1: XXXXX MB
Migration only
RAID 6
Migration with addition
0:1:3: XXXXX MB
Go
Information of HDDs in the disk group in which a VD is defined.
Migration Only: Allows change of RAID level.
Migration with addition: Allows addition of hard disk drive and change of RAID level.

5. Select "Migration with addition".

6. Specify the RAID level used after reconstruction.

7. Select a HDD to be added.

8. When you finished steps 5 to 7, click [Go] at the lower right of the screen.

9. The progress of reconstruction is displayed on the lower left of the screen. Click [Home] at the lower left of the screen to return to the WebBIOS Top Menu.

IMPORTANT:

- The capacity of virtual disk may be incorrectly displayed after reconstruction. In this case, perform Scan Devices from the Top Menu.
- Click [Home] while the background task such as Consistency Check, Rebuild, or Reconstruction is being executed. With the progress indication being displayed, the background task may be processed at slow rate.

WebBIOS and Universal RAID Utility

You can use Universal RAID Utility for configuration and management, monitoring of RAID System after start up operating system.

The point to be kept in mind when using Universal RAID Utility together with WebBIOS is as follows.

Terms

WebBIOS and Universal RAID Utility are different in term.

When you use Universal RAID Utility together with WebBIOS, please convert terms by the following list.

Term of WebBIOS	Term of Universal RAID Utility
Adapter	RAID Controller
Virtual Disk	Logical Drive
Disk Group	Disk Array
Physical Drive	Physical Device

Number and ID

The number to manage each component of RAID System of Universal RAID Utility is different to WebBIOS.

Adapter and RAID Controller

WebBIOS manages Adapter by a number beginning with 0. You can see a number of Adapter where [Adapter No] in [Adapter Selection] menu.

Universal RAID Utility manages RAID Controller by a number beginning with 1. You can see a number of RAID Controller where [Number] in the property of RAID Controller on RAID Viewer or [RAID Controller #X] in the property of RAID Controller on raidcmd command.

Also, you can see the number of Adapter managed by WebBIOS where [ID] in the property of RAID Controller by Universal RAID Utility.

Virtual Disk and Logical Drive

WebBIOS manages Virtual Disk by a number beginning with 0. You can see a number of Virtual Disk where [VD X] in Virtual Drives.

Universal RAID Utility manages Logical Drive by a number beginning with 1. You can see a number of Logical Drive where [Number] in the property of Logical Drive on RAID Viewer or [RAID Controller #X Logical Drive #Y] in the property of Logical Drive on raidcmd command.

Also, you can see the number of Logical Drive managed by WebBIOS where [ID] in the property of Logical Drive by Universal RAID Utility.

Disk Array

WebBIOS manages Disk Array by a number beginning with 0. You can see a number of Disk Array where [DG X] in Physical Drives and Virtual Drives.

Universal RAID Utility manages Disk Array by a number beginning with 1. You can see a number of Disk Array where [Disk Array] in the property of Logical Drive on RAID Viewer or [RAID Controller #X Disk Array #Y] in the property of Disk Array on raidcmd command.

Physical Drive and Physical Device

WebBIOS manages Physical Drive by three numbers (Connector number:Enclosure number:Slot number). You can view these numbers shown by [x:x:x] in Physical Drives box. Note, however, the Connector number is always shown as "()" because it is not supported with this server. The Enclosure numbers are represented by a number beginning with 1, and the Slot numbers are represented by a number beginning with 0.

Universal RAID Utility manages Physical Device by a number beginning with 1 and ID, Enclosure number, and Slot number. The numbers of physical devices connected to the controller are sorted in ascending order based on ID and assigned number beginning with 1, starting from the smallest number. The ID is same value of Connected Port shown in Physical Drives Properties box in WebBIOS. Enclosure number and Slot number are assigned with a number beginning with 1.

> **IMPORTANT:** Note that the slot numbers shown in Physical Drives box of WebBIOS are represented by a number beginning with 0, but those in Universal RAID Utility are represented by a number beginning with 1.

Setting of Priority

WebBIOS displays and sets Rebuild Priority and Patrol Read Priority, Consistency Check Priority of RAID Controller by percentage. But, Universal RAID Utility uses three levels as High/Middle/Low for them.

The setting value of WebBIOS and the display level of Universal RAID Utility

Item	Setting value of WebBIOS	Universal RAID Utility level
Rebuild Priority Rebuild Rate (WebBIOS)	80 to 100	High
	31 to 79	Middle
	0 to 30	Low
Patrol Read Priority Patrol Read Rate (WebBIOS)	80 to 100	High
	31 to 79	Middle
	0 to 30	Low
Consistency Check Priority Consistency Check Rate (WebBIOS)	80 to 100	High
	31 to 79	Middle
	0 to 30	Low

The setting level of Universal RAID Utility and the setting value

Item	Setting level of Universal RAID Utility	Setting value
Rebuild Priority Rebuild Rate (WebBIOS)	High	90
	Middle	50
	Low	10
Patrol Read Priority Patrol Read Rate (WebBIOS)	High	90
	Middle	50
	Low	10
Consistency Check Priority Consistency Check Rate (WebBIOS)	High	90
	Middle	50
	Low	10

NOTES:

- WebBIOS can set BGI Rate (Background Initialize Priority). But Universal RAID Utility can't set it.
- Universal RAID Utility can set Initialization Priority. But, Internal RAID Controller does not have the function of the setting of Initialization Priority. Therefore, Universal RAID Utility doesn't display [Initialization Priority] in the property of RAID Controller. Also, it will fail that you change the Initialization Priority by raidcmd command.

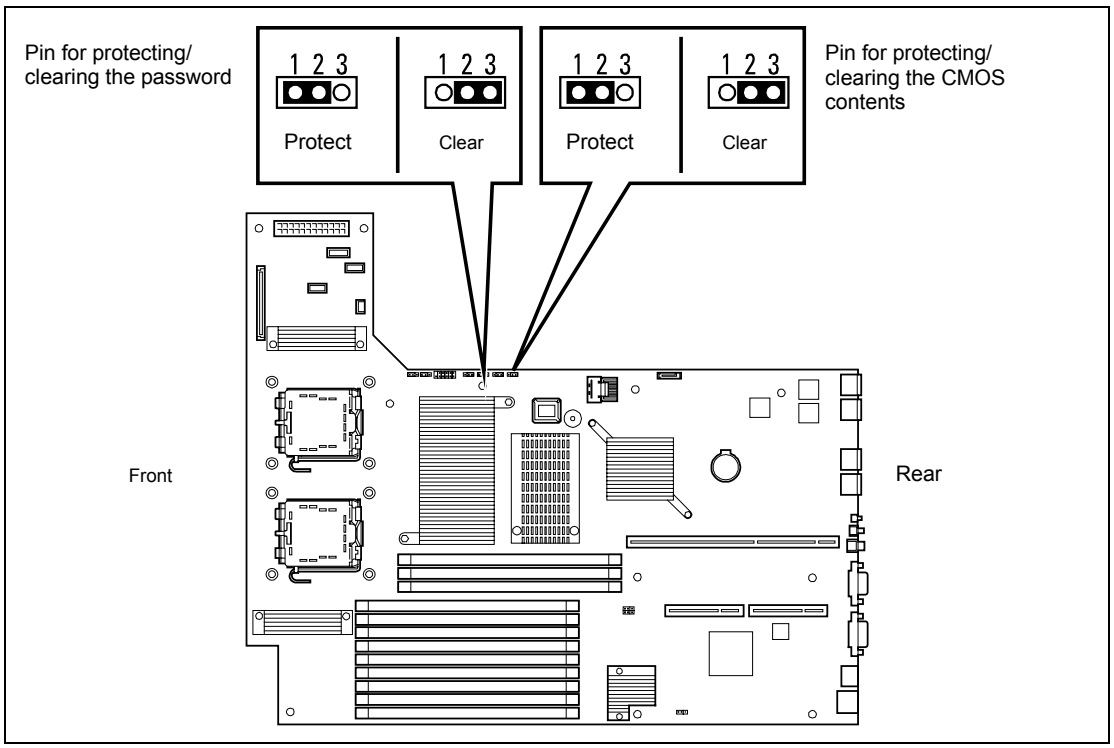
CONFIGURING MOTHER BOARD JUMPERS

With the pre-installed SETUP utility, you can set desired passwords to protect the data stored in the server against access from unauthorized users. When you forget the passwords, however, you may want clear them. The following describes how to clear these passwords. You can also use the following procedure to clear the CMOS data in the server.

IMPORTANT:

- Clearing the CMOS data resumes the factory-set configuration data.
- After clearing CMOS, you must run the BIOS SETUP utility and execute the following menus to reconfigure your mother board.
  – Load Setup Defaults in the Exit menu
  – Memory Retest of Memory Configuration in the Advanced menu
  – Processor Retest of Processor Settings in the Main menu
- Refer to "RAID System Configuration" described earlier in this chapter for RAID configuration jumper setting.
- Do not change any other switch settings. Any change may cause the server to fail or malfunction.

To clear passwords or the CMOS data, use the jumper switch on the mother board of the server. The following figure illustrates the jumper switch location.



The following describe the clearing procedure.

WARNING

Observe the following instructions to use the server safely. Failure to follow these instructions may result in death or serious personal injury. See pages 1-3 to 1-8 for details.

- Do not disassemble, repair, or alter the server.
- Do not remove the lithium battery.
- Do not connect the ground line to a gas pipe.

CAUTION

Observe the following instructions to use the server safely. Failure to follow these instructions may result in death or serious personal injury. See pages 1-3 to 1-8 for details.

- Never attempt to lift the server only by yourself.
- Make sure to complete board installation.
- Do not install the server on a rack with leaving covers removed.
- Do not pinch your finger with mechanical components.
- Note high temperature.
- Do not pull out a device from the rack if the rack is unstable.
- Do not leave more than one device being pulled out from the rack.

Clearing CMOS Data

1. See the section "Preparing for Installation and Removal" as described in Chapter 9 of this guide to prepare.
2. Remove the logic cover (see Chapter 9).
3. Locate the position of the jumpers on the mother board you are changing.
4. Move the jumper strap to the CMOS clear position.

   Refer to the previous illustration to find the location of the jumper.
5. Wait for a while (about 5 seconds), and then reinstall the jumper block to the default position.
6. Reinstall the server removed in Step 2.
7. Plug the power cord to your server and turn on the server.
8. Press **F2** at the prompt to run the BIOS SETUP utility, and select "Load Setup Defaults" at the Exit menu.

Clearing Password

1. See the section "Preparing for Installation and Removal" as described in Chapter 9 of this guide to prepare.
2. Remove the logic cover (see Chapter 9).
3. Locate the position of the jumpers on the mother board you are changing.
4. Move the jumper strap to the password clear position.

   Refer to the previous illustration to find the location of the jumper.
5. Reassemble the server, and press the POWER switch to turn on the server.
6. Press **F2** during POST to run the BIOS Setup utility, set the password again, and select [Exit Saving Changes].
7. Power off the server, and move the jumper strap to the password protect position.
8. Reassemble the server.